

Summary of Proposed Actions

Prepared for the Cambridge Getting to Net Zero Task Force

April 29, 2015



Foreword

This summary document contains the proposed set of actions identified by the Getting to Net Zero Task Force and four associated working groups.

Each of the proposed actions is discussed in detail in this report, with a description of how the action supports the getting to net zero objective. This includes an estimate of greenhouse gas emission reductions associated with each action, short, medium and long term objectives, and key steps to implementation. The proposed list of actions reflect the consensus reached among key sectors of the community on what needs to happen to achieve net zero emissions from buildings in Cambridge.

The following are key cross-cutting objectives that are embedded within the proposed actions that will drive progress toward net zero:

(a) **Targeted improvements to existing buildings:**

The Building Energy Use and Disclosure Ordinance (BEUDO) will provide the information necessary to target energy retrofit activity, including, over the long term, the regulation of energy efficiency retrofits at time of renovation and/or sale of property.

(b) **A bold policy target of net zero emissions for new construction:**

New buildings should achieve net zero beginning in 2020, starting with municipal buildings and phasing in the requirement for other building types between 2022-2030.

(c) **Proliferation of renewable energy:**

Increase renewable energy generation, beginning with requiring solar-ready new construction and support for community solar projects, evolving to a minimum requirement for onsite renewable energy generation.

(d) **Coordinated communications and engagement:**

Support from residents and key stakeholders is imperative to the success of the initiative.

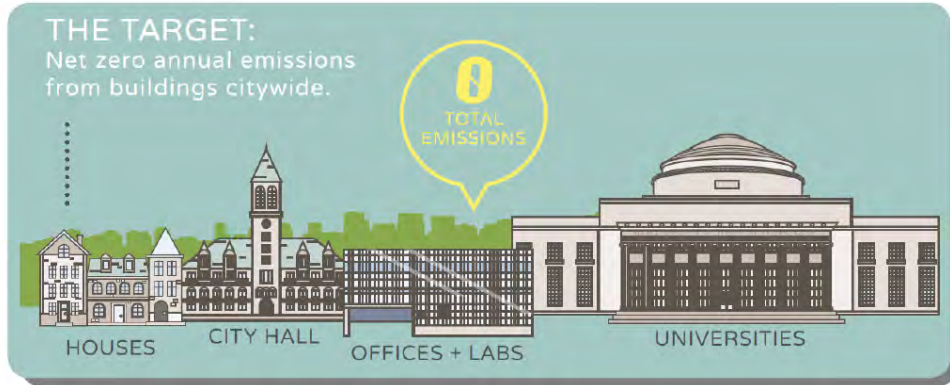


Defining Net Zero

For this project, the Task Force developed the following definition of net zero:

The Task Force defines net zero with respect to the city as a whole as:

A community of buildings for which, on an annual basis, all greenhouse gas emissions produced through building operations are offset by carbon-free energy production. Achieving the net zero objective relies on a combination of energy efficiency improvements, renewable energy production and, where necessary, purchase of carbon offsets or, potentially, credits (that meet specific criteria).



The definition includes Scope 1 and Scope 2 GHG emissions sources as defined in the widely used Greenhouse Gas Protocol issued by the Greenhouse Gas Management Institute. This protocol calculates emissions related to all ongoing operations of a facility, including on-site combustion and purchased energy. The net zero target does not include embodied emissions generated from the manufacture of building materials, building construction activities, occupant transportation or waste.

The Task Force defines net zero with respect to individual buildings as:

An annual balance of zero greenhouse gas emissions from building operations achieved on a building by building basis using energy efficiency, renewable energy, and if necessary carbon offsets or, potentially, credits as a temporary measure.

The scope includes **emissions from building operations** including the following:

- Conditioning and ventilation
- Domestic hot water use
- Lighting
- Process and plug loads.

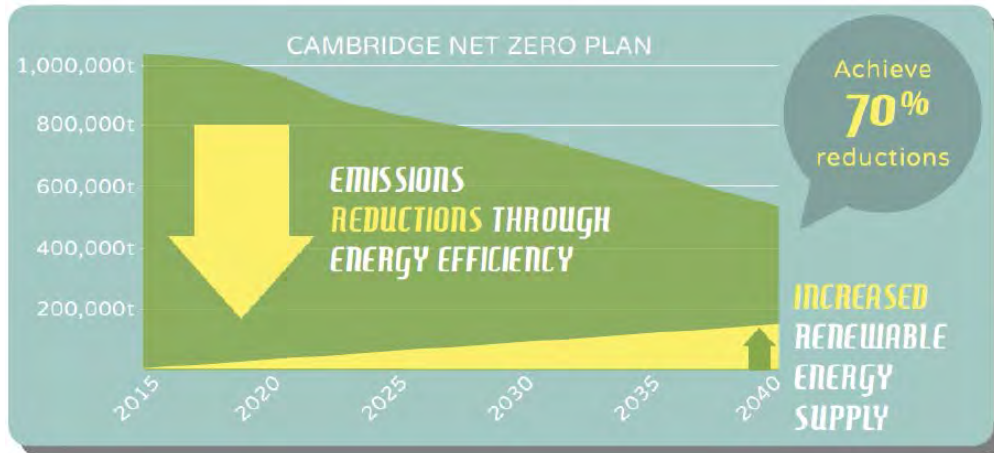
The Getting to Net Zero Action Plan includes strategies supporting achievement of the following, as **key elements of a net zero community**:

- Highly energy efficient buildings (new + existing)
- The use of onsite renewables
- The use of offsite renewables
- The use of offsets and, potentially, credits (as a temporary measure to achieve net zero).

The target of achieving community-wide net zero emissions in Cambridge is ambitious. Actions supporting the achievement of this goal need to be balanced with other City priorities such as continued economic growth, housing affordability, historic preservation, and planning and urban design objectives. To this end, the approach to achieving net zero does not solely rely on exemplary performance of any one sector.

Proposed Actions

This section provides detail on the set of proposed actions that will put Cambridge on the path to achieving the Getting to Net Zero objective.



Actions

1. Energy Efficiency in Existing Buildings

- 1.1.1 Custom Retrofit Program
- 1.1.2 Additional BEUDO Requirements
- 1.1.3 Upgrades at Time of Renovation or Sale
- 1.1.4 Operations and Maintenance Plan Requirement for New Construction

2. Net Zero New Construction

- 2.1 Create Net Zero Targets for New Construction
- 2.2 Net Zero Incentives
 - 2.2.1 Market-based Incentive Programs
 - 2.2.2 Height + FAR Bonus
- 2.3 Increase Green Building Requirements in the Cambridge Zoning Ordinance
- 2.4 Net Zero Requirement for New Construction + Deep Retrofits of Municipal Buildings
 - 2.4.1 Net Zero Requirement for New Construction
 - 2.4.2 Deep Retrofits of Municipal Buildings
- 2.5 Removal of Barriers to Increased Insulation

3. Energy Supply

- 3.1 Low Carbon Energy Supply Strategy
- 3.2 Rooftop Solar Ready Requirement
- 3.3 Develop a Memorandum of Understanding with Local Utilities

4. Local Carbon Fund

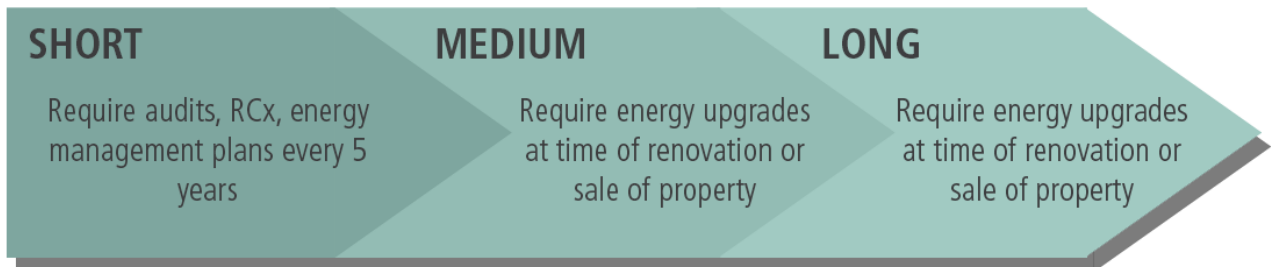
- Investigate Local Carbon Fund

5. Engagement & Capacity Building

- 5.1 Communication Strategy
- 5.2 Develop Ongoing Capacity to Manage Getting to Net Zero Project
- 5.3 Net Zero Lab Standards and Maintenance Plan Requirement for New Construction

Action 1 – Energy Efficiency in Existing Buildings

The intent of this action is to ensure that all buildings are operating optimally and, where necessary, are retrofitted to maximize efficiency. A key tool that will catalyze this action is the data collected through the Building Energy Use and Disclosure Ordinance (BEUDO). In 2015, the City will possess the first year of benchmarking data. This data will lay the groundwork to support a targeted approach to building improvements, by identifying the relative efficiency of buildings. By targeting the most inefficient buildings (e.g. buildings that rank in the bottom 20%) for improvement, Cambridge will see the greatest reductions in terms of energy use and GHG emissions. Consistent with the recommendations of the BEUDO, a new set of proposed actions below are recommended specifically for buildings covered by the ordinance. In addition to these requirements, other tools and policies will be directed broadly across all building types, where appropriate, in order to achieve the necessary emissions savings.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Short Term (1-4 Years)

1.1.1 Custom Retrofit Program

Continue to work with the utilities to adapt current incentive programs to take a performance-based approach, where the incentive amount is determined by the relative GHG reductions associated with a given retrofit project (e.g. \$/ton). There are currently incentive programs offered by utilities that are well utilized, however, a performance-based approach with a focus on GHG reduction could yield more effective results. City staff are currently in discussions with Eversource regarding a retrofit pilot program for multi-family buildings that could potentially serve as a pilot for this performance-based approach that could, in the future, be expanded to other sectors.

1.1.2 Additional BEUDO Requirements

To build on the Building Energy Use and Disclosure Ordinance (BEUDO), Cambridge should introduce the following addenda to the existing ordinance:

- ◆ Require energy audits and retro-commissioning every five years for buildings that perform below a predetermined threshold. This will provide, in addition to the EnergyStar Portfolio Manager rating, in-depth information about building operations and areas that need improvement. With this information, building owners will have a better understanding of their building's performance, supporting a shift toward more efficient, higher performing buildings.
- ◆ Require buildings that score below a certain percentile performance rating (i.e. as calculated by Portfolio Manager) to submit an operations and energy management plan up to every five years articulating what actions will be taken to improve energy efficiency and/or shift to renewable or low-carbon fuel sources.

Medium Term (4-10 Years)

1.1.1 (Cont.) Custom Retrofit Program

Continue, as applicable, to collaborate with the utilities or through the development of new third-party programs such as a local carbon fund (see Action 4) to offer a 'custom' retrofit program that offers cash incentives determined by the total tons of GHG savings (\$/ton).

1.1.3 Upgrades at Time of Renovation or Sale

Initiate a study to explore a requirement for energy upgrades at the time of renovation permit or, if appropriate, time of sale of property. Renovations are an appropriate time to require upgrades, while investments are being made and work is being done on the buildings. The sale of property can also be an opportune time to invest in building improvements if buildings have amassed equity.

To assess the feasibility of a time-of-sale retrofit requirement, a market analysis should be undertaken to determine an appropriate scope of retrofit to regulate, which building types would be included in the requirement, and whether the retrofit would be the responsibility of the buyer or the seller. Typically, any requirements at time of renovation or sale are modest and target only poor performers within a given building class or use, for example, the bottom 20% in a Portfolio Manager use category. Careful consideration will be given to ensure that any proposed program or regulation will not result in adverse unintended consequences, such as further disinvestment in poorly maintained buildings.

1.1.4 Operations and Maintenance Plan Requirement for New Construction

Require, as a condition of building occupancy, that applicants submit energy management plans (or institution-level reports, as appropriate) detailing how the building will be operated to meet the intent of the energy efficient design. The City should establish a template for energy management plans based on existing frameworks that are common in the commissioning industry and are designed for simplicity and effectiveness. While the requirement would apply to new construction, its objective is to ensure future existing buildings are operated to their maximum potential. While this requirement applies to new construction, it serves as an important bridge to ensure that as buildings age, they remain optimized. The intent will be to align requirements for these proposed operations and energy management plans with the plans contemplated for poor performing building as part of the new BEUDO requirements in action 1.1.2. These symbiotic polices are designed to help owners keep their buildings operating at their peak potential from construction to the end of a buildings useful life.

Long Term (10+ Years)

1.1.3 (Cont.) Upgrades at Time of Renovation or Sale

Pending the feasibility and cost benefit analysis of this set of proposed actions, if favorable, the City could increase the performance improvement thresholds at time of renovation or sale of property.

Contribution to net zero objective

This set of actions is instrumental to increasing the energy efficiency of Cambridge's existing building stock. It will build significant capacity among building owners and industry, and it will also generate significant greenhouse gas reductions. BEUDO arms building owners with the knowledge and the tools to identify areas of improvement and take action to implement improvements to their buildings. This move addresses one of the key barriers to energy efficiency

– the lack of knowledge among building owners as to their building’s performance and capacity for improvement – and introduces tools to stimulate action.

Projected Greenhouse Gas Reductions

An estimated 70,000 tons of GHG emissions could be saved from this set of actions. This estimate is based on data quantifying typical uptake of incentive programs, evolving to more aggressive uptake over time, combined with the projected reductions associated with regulatory actions.



Summary

The community-wide net zero target requires deep emission reductions from existing building operations citywide. This action stimulates retrofit activity through a combination of capacity building, incentives and regulation. To best achieve an absolute emissions reduction target, it is advised to target the least efficient buildings (e.g. bottom 20%) for improvement as opposed to aiming to improve efficiency in all buildings. Multiple building energy benchmarking reports demonstrate that focusing finite resources on a smaller pool of the least efficient buildings achieves greater reductions than applying the same resources over a larger number. Building energy benchmarking data will reveal the most and least efficient of Cambridge’s large buildings (over 25,000 square feet). This information is valuable in that it identifies the areas of greatest opportunity for improving energy performance. For example, based on the findings of New York City’s building energy benchmarking data, the worst 20% of buildings generate 53% more emissions than the average building.¹

Using data collected through Portfolio Manager, the City will be able to determine where and what improvements are necessary in order to move the median energy performance to a desirable level, one that supports the net zero objective. Building owners will understand how their building’s energy use compares to that of their peers, and may be motivated to meet a certain performance level, and benefit from the associated improvements and cost savings.

Incentives and regulation will further drive action and support deep emissions reductions and the trajectory to net zero. Requiring energy management plans from the most inefficient buildings will result in savings, raising the median energy performance of citywide buildings significantly. An incentive program will stimulate building owners to take action to implement improvement projects. Finally, energy upgrades at time of renovation or sale will ensure a steady stream of energy retrofit projects throughout the community.

Implementation

Policy Amendments

As an amendment to the BEUDO, Cambridge should stimulate action among the city’s most inefficient buildings. This policy amendment can be introduced following one year of benchmarking data collection. Stakeholder consultation will be necessary in advance of introducing policy amendments.

The City will need to determine which buildings will be impacted by the new requirements. This will become clearer once the first year of benchmarking data is collected and the City has information about the relative performance of all buildings covered by the ordinance. Based on the energy consumption across the building stock, the City will be able to analyze the data and calculate the emission reduction impact associated with energy efficiency improvements among the poorest performing buildings. The relatively inefficient buildings can be considered low hanging fruit, as there is ample room for improvement and, thus, opportunity for significant emissions reductions associated with operational improvements and retrofits.

¹ 2014 New York City Local Law 84 Benchmarking Report – City of New York, Office of the Mayor: 2014

- Poor performers as per percentile rating in Portfolio Manager (e.g. <60% or worst 20% of those in sample)
- Size/type of building

The City should establish what information should be included in an energy management plan based on input from building energy managers and the building commissioning industry. To streamline plan development and evaluation, the City could develop a template and a sample plan based on already existing standards such as ASHRAE audits and existing building commissioning standards as well as using both the New York and Chicago programs as potential models. There will be a training component associated with the policy, but the more straightforward the requirements, the more effective the policy and likelihood of participation and compliance.

- How frequently should owners submit a plan?
- What set of actions should be included in a plan?
- Reduction target setting included?

Upgrades required at time of renovation or sale of property

Further study should determine what action might be required at time of renovation or, if appropriate, time of sale or both. The City should undertake a comparative analysis of different approaches and related impacts (i.e. whether required upgrades are based on prescriptive actions and associated payback period, percentage performance improvement, meeting code or other threshold, or total GHG reduction). A thorough costing exercise must be undertaken to understand the cost impact of a new requirement, followed by industry consultation.

Retrofit incentives

The City should undertake energy modeling and costing exercises to determine an effective formula for incentive dollar per ton. The incentive amount should be enough to subsidize the cost of the work and just enough to overcome the barrier around initial capital expenditure. Industry should be consulted and focus groups and other market research tools should be used to determine the appetite for an incentive offering among building owners in Cambridge.

Key Actions

- Undertake study to determine impact of proposed amendments (i.e. GHG reductions over time)
- Conduct a study of cost and emissions impacts of proposed mandatory upgrades

Action 2 – Net Zero New Construction

The purpose of the Getting to Net Zero Task Force was to develop a ‘made in Cambridge approach’ to getting to net zero construction in a reasonable timeframe. Below is a series of recommendations that will stimulate investments in net zero innovation, position municipal buildings to lead the way in advance of private development, and raise current green building standards as they pertain to developments over 25,000 square-feet.

The ideas that are being contemplated are bold and will transform the built environment. While the challenge is considerable, it should be noted that ten years prior to the convening of this Task Force there were no LEED certified buildings in Cambridge, while today there are more than 168 either active or completed LEED projects in the city, and there is a requirement to build to LEED Silver and, in some areas, LEED Gold. The magnitude of these proposed actions for new construction is similar in proportion, but Cambridge now has the advantage of an already existing green building industry and the input and counsel of experienced and knowledgeable stakeholders.

The proposed Cambridge targets for net zero new construction for most building types is approximately five years ahead of the industry benchmarks adopted by ASHRAE, Architecture 2030 and USGBC for commercial buildings. The policy target dates for low-rise residential construction are two years behind California, which is targeting net zero by 2020 (but began the process in advance of Cambridge). The recommended requirements are intended to show leadership and create an environment of innovation. The process and governance framework in which they reside is to ensure that meaningful financial analysis can take place and industry capacity is commensurate with the requirements. It is important to note that the recommended net zero target years will be evaluated at regular intervals and regulatory changes will be proposed at least 24 months prior to final enactment.

Action 2.1 – Create Net Zero Targets for New Construction

The table below includes a preliminary set of target dates for different building types to achieve net zero. These target dates are proposed as policy goals for both industry and Cambridge staff to work toward. It is recommended that regular meetings be held with stakeholders to evaluate the evolving state of technology and construction practices as they relate to targets dates identified below. Specifically, Cambridge staff will consult with industry and other key stakeholders at least two years in advance of proposing regulations requiring buildings to be net zero. The factors that will be reviewed as part of this assessment and consultation are as follows:

- The number of existing net zero buildings of that building type in Cambridge and Northeast
- Technical feasibility/industry capacity
- Access to renewable energy supply on-site or in the region
- Economics including a ‘net present value’ analysis
- Contribution to other goals such as resiliency

The variation in target years reflects the varying degree of complexity associated with achieving net zero in different building sectors and specifically recognizes the challenges faced by lab buildings in meeting these aggressive targets.

Table 1 - Targets for net zero new construction by sector

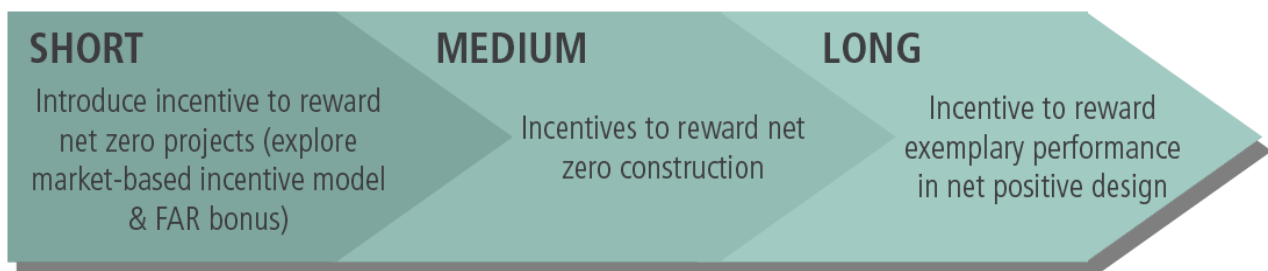
Type:	Municipal	Residential	Multi-Family	Commercial	Institutional	Labs
Target Year:	2020	2022	2025	2025	2025	2030

It should be noted that when the Task Force defines net zero for new construction it does not include embodied emissions generated from the manufacture of building materials, building construction activities, occupant transportation or waste. The scope does include emissions from Scope 1 and Scope 2 GHG emissions sources as defined by the widely used Greenhouse Gas Protocol.² This protocol calculates emissions related to all ongoing operations of a facility, including on-site combustion and purchased energy.

Action 2.2 – Net Zero Incentives

To inspire leadership and encourage investment in innovation, it is recommended that the City of Cambridge develop a compelling incentive package for projects to achieve net zero. To encourage broad uptake, incentives should be offered across sectors, including small-scale residential, multifamily buildings, commercial offices, and labs. The incentive approach should be developed with industry input through consultation, and comprehensive economic analysis should be undertaken to validate any proposed financial investment. The purpose of the incentive is to drive developers to achieve net zero in advance of net zero new construction requirements being phased in by sector between 2022-2030.

Regular meetings with stakeholders such as the Cambridge Sustainability Compact Building Sub-committee should be held to assess whether technology and construction practices have progressed to the point where it would be possible to move the effective net zero date for labs forward to 2025 if key economic indicators are satisfied.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Short Term

Incentive models recommended for exploration include:

2.2.1 Market-based Incentive Program

In order to achieve net zero buildings in ten years, Cambridge should explore the use financial mechanisms to motivate the market and accelerate innovation. MIT and Harvard have agreed to collaborate with the City on this investigation in order to determine the most effective incentives for the Cambridge context. These could include tools such as green building bonds, “green banks”, and adjusting pricing of permit fees based on performance.

An example of this pricing adjustment could be a performance fee and rebate system that rewards projects on a sliding scale based on energy performance. This strategy incents high performing buildings (and discourages inefficient projects). The incremental nature of the incentive structure (i.e. having a fine grained sliding scale of rebates and fees) encourages exemplary performance.

The performance fee and rebate model relies upon fees and refunds based on the performance of a particular project. Applicants would be required to place a deposit or a bond at the time of permit application. A formula determines the fee amount, and the refund amount is based on thresholds of energy performance. Poor performing buildings would receive little or no refund,

² <http://www.ghgprotocol.org>

average-performing projects break even, and high performance buildings receive rebates for exceptional energy performance.

The primary benefit of the tool is that it functions as both an incentive for high performance and as deterrent to building inefficient buildings. The system is widely endorsed by such thought leaders as the Rocky Mountain Institute and a similar model has had transformative effects in the auto industry where it has been broadly applied.³ This model is recommended as having the best potential to generate exemplary performance and would not impact existing land use regulation with regards to height and density. It will be critical in the design of the program to ensure that buildings that are meeting the City's LEED Building requirements now and into the future are not further penalized.

Recognizing the complexity of implementing such a program, it is recommended that the design and feasibility of this tool be thoroughly researched in partnership with the institutions noted above and in consultation with industry to better understand its impact and potential effectiveness in the Cambridge context. Further, should the feasibility analysis prove favorable, the approach should be initially tested by way of a limited pilot in residential sector first for new construction and major renovations where there is less complexity and shorter construction cycles. The pilot would then be extended to commercial and institutional sectors only after the business model and institutional process has been further developed after at least 24 months of trials.

2.2.2 Height + FAR bonus (new construction)

To generate early action the City can explore the potential impact of offering additional floor area allowance and extra height to projects that achieve net zero emissions. Projects will need to demonstrate and commit to net zero emissions through their design in order to meet eligibility requirements for additional FAR award. A performance deposit should be held until 24 months following occupancy. Projects will also have to agree to share learnings on how net zero was achieved in their projects. This approach should be investigated in the context of other land use studies.

Medium Term

2.2.1 (cont.) Market-Based Incentive Program

Incentive program in place by sector until the year when net zero construction is mandated.

Long Term

2.2.1 (cont.) Reward Net-Positive Construction

Once net zero new construction becomes a requirement (likely by way of zoning legislation), the incentive program can be modified to reward projects that are net-positive, with the reward level based on the amount of excess energy generated by the project. The intention is that these net positive buildings will help to balance the emissions from existing buildings and enable Cambridge to achieve net zero emissions as a community of buildings.

Contribution to net zero objective

Incentives are a key component to the net zero strategy, recognized as a market driver to push early adopters and compel innovation. While Cambridge will move forward with more stringent regulations, an effective incentive program is a necessary complement, expected to generate increased activity and momentum toward the target.

³ Market Based Incentives: A Key to Breaking U.S. Oil Addiction, Cohen & Lowe, August 2010

Projected greenhouse gas reductions

This incentive program could result in approximately 85,000 tons of annual greenhouse gas reductions when combined with the proposal to require all new construction to be net zero emissions at various target years through 2030. This incentive lays the groundwork to enable a future requirement.



Summary

The future looks positive for net zero buildings. A recent study by Integral Group, Davis Langdon, and BNIM Architects surveying the costs and outcomes of high performance buildings shows evidence that energy efficient buildings are being built at low costs.⁴ The cost of renewable energy has been on the decline for the past seven years, and based on current estimates there are approximately 50 commercial or institutional projects that are currently operating at net zero and hundreds of residential projects in North America.⁵

While the industry as a whole evolves toward a paradigm of resource efficiency, Cambridge's initiative to become a net zero community will accelerate the rate of uptake in the local context. This strategy recognizes that while the target is achievable, it will require significant effort and a better understanding of how to effectively build net zero buildings in the local market. The information collected through the Building Energy Use Disclosure Ordinance will further help to understand this unique context better, and the program will require consistent ongoing governance and input in order to move towards a market where net zero buildings proliferate.

In order to encourage early action among developers, owners and design and construction professionals, the City should explore the development of an incentive program to reward projects that demonstrate a commitment toward achieving net zero objectives. Incentive amounts may vary by level of achievement seeing that while some early adopters may be successful in achieving a net zero balance, others may achieve deep energy reduction targets but may be challenged to meet the energy supply requirement.

Implementation

To inform the design of the program or set of programs, the City should involve industry at the outset. Through a series of consultation activities, City of Cambridge staff should aim to understand the specific barriers to net zero design from the perspective of industry representatives. One barrier that has been identified as being of particular importance to Cambridge is Industrial Hygiene Standards for laboratory buildings that require substantial ventilation resulting in a large impact on energy use. (See Action 5.1) Regulatory, financial, and capacity issues should be identified, and an incentive program should be designed to eliminate or mitigate these barriers. For example, consultation may reveal that there are building code constraints that need to be relaxed; that the cost of renewable or low-carbon energy is currently prohibitive; or that there is a lack of expertise in the local market to deliver super-efficient construction or retrofit projects.

Depending on the barriers that are identified, a program offering could include the following elements:

- Free training
- Cash incentives

Program models should be evaluated based on their potential to transform the market, which includes the potential administrative burden to the City; and the capacity of each program to address the barriers; the associated costs and the resource needs of the Cambridge development industry.

⁴ The Power of Zero, *Optimizing Value for the Next Generation of Green*: Lesniewski, Morris & Mathison: 2013

⁵ Getting to Zero 2012 Status Update – New Buildings Institute: March 2012

- How much staff time is needed for program development? Program delivery?
- What are the associated administrative costs?
- What are the financial implications, in dollars per project and dollars per GHG reduction?
- How does it compare to other incentive programs that are currently offered in the market?

A costing study should be undertaken to understand the financial implications and potential risks associated with the proposed program.

To support early net zero projects that may present design approaches that are unusual or unprecedented in Cambridge, appropriate staff resources should be directed toward ensuring that these are kept on track and the review period is not prolonged, and that applicants have access to technical support as needed.

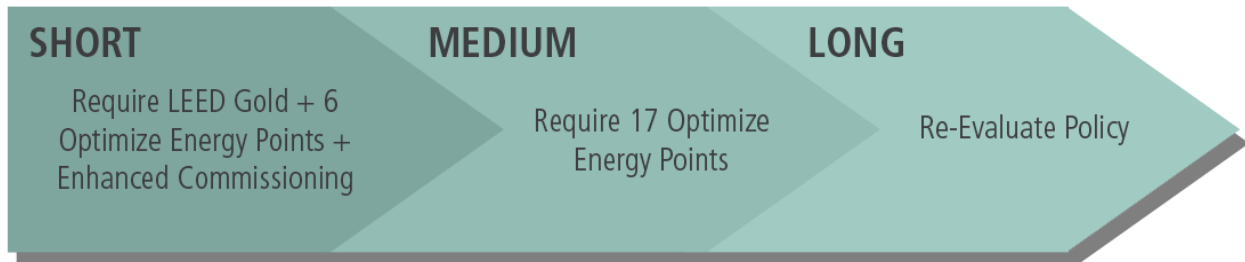
Net zero new construction and renovation projects can be treated as case studies and priorities by the permitting department. The City can promote these projects using their communication channels in order to generate positive attention to the applicant, and to use the project to educate and encourage further innovation.

Key Actions

- Undertake a thorough costing and feasibility study to determine the financial implications, appropriate performance thresholds, target market impact and potential risks associated with a proposed program, with the goal of developing a program design that is revenue-neutral and poses no financial risk to the City.
- Review opportunities with land use planning staff to increase FAR or height in appropriate areas for commercial buildings targeting net zero. Review tradeoffs with other density bonus allowances currently in the zoning code or under consideration through the upcoming citywide planning process.

Action 2.3 – Increase Green Building Requirements in Cambridge Zoning Ordinance

Increase the Green Building Requirements in the Cambridge Zoning Ordinance for projects requiring a special permit to require higher levels of green building design and energy efficiency for new construction and major renovations over 25,000 square feet. This includes a shift to LEED Gold citywide (as is already the case in parts of Kendall Square). In addition, with a distinct focus on energy efficiency and GHG emission reduction, the policy should require projects to pursue a prescribed number of LEED energy efficiency points, and enhanced commissioning requirements.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Short Term (1-4 Years)

Policy Amendment

Revise the Cambridge Zoning Ordinance, such that buildings subject to the requirements of section 22.20 must meet the following:

- Meet LEED criteria at the Gold level for LEED NC, CS, CI, Midrise, and Homes depending on the project scope. LEED, per Section 22.20 of the Cambridge code, refers to the Leadership in Energy and Environmental Design Green Building Rating System as developed and revised from time to time by the United States Green Building Council (USGBC).
- Achieve a minimum of 6 points (22% improvement) under LEED's Optimize Energy Performance credit.
- Meet the requirements of LEED's Enhanced Commissioning credit

The amendment is meant to achieve two things: (1) ensure that the appropriate LEED Product is being applied to the scope of the project; and (2) raise the energy performance of the policy to be consistent with the goals of the Getting to Net Zero Task Force. A survey of LEED Certified buildings in Cambridge and Boston has shown that currently the average LEED Building is achieving an average of 11 Energy and Atmosphere credits.

Update compliance process:

To increase the effectiveness of the policy the following additional steps are recommended (see flow diagram below):

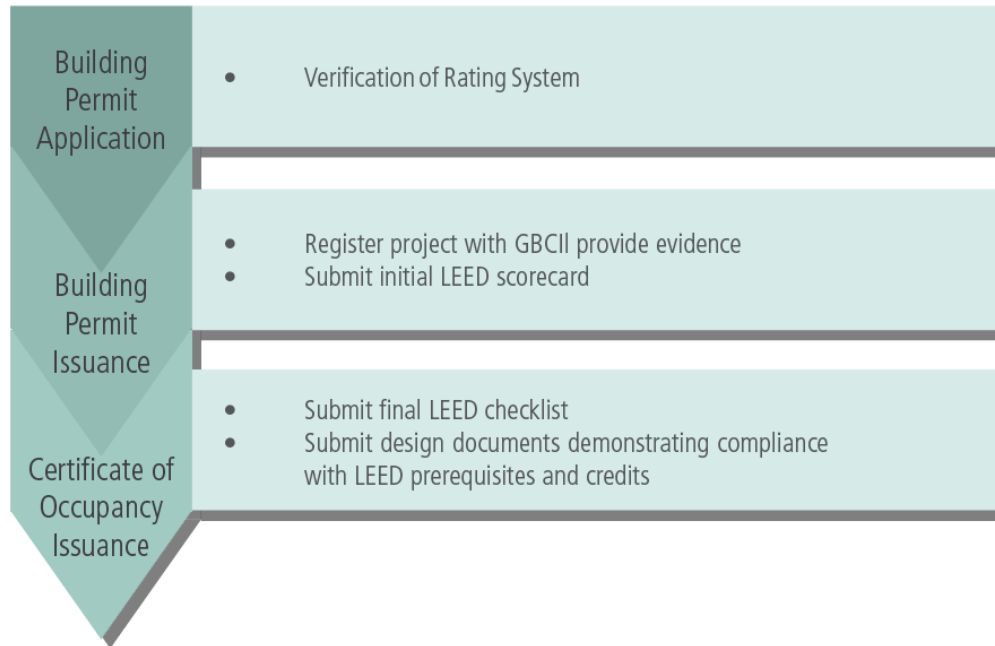
- Applicants must indicate which LEED rating system will be used for their project; staff should ensure that the appropriate LEED tool is used for the building type.
- Prior to issuance of the first Building Permit, applicants must provide evidence that their projects are registered with the Green Building Certification Institute (GBCI).
- Prior to issuance of the first Certificate of Occupancy, applicants will be required to submit the final LEED checklist, and further be required to complete and submit proof

that all prerequisites and credits eligible for design document review under a split review process ⁶have been reviewed and approved by GBCI.

- Enhance CDD staff capacity to review projects under Article 22.20 and administer the requirement.

Staff recognize that where LEED for Homes/Mid-rise is being used, submission of split review documentation may not be possible. In this event, submission of complete documentation within one year of occupancy will be required.

Proposed Compliance Process



Medium Term (4-10 Years)

Review with industry and investigate increasing the required number of points under the Optimize Energy Performance credit to a minimum of 17 points (approximately equivalent to a 46% improvement over ASHRAE 90.1 2007 as described in LEED 2009). Monitoring of how energy is treated in each LEED tool is required as this strategy evolves is recommended. For example, the projected requirement should be expressed in current version of the LEED/ASHRAE at the time of the policy update recognizing that a 46% improvement over ASHRAE 90.1 2007 may result in less than 17 points in future iterations of LEED. Currently, the energy modeling requirements of LEED for Midrise projects are commensurate with other products, but this may not always be the case.

Note that the target for ASHRAE 90.1 is set to evolve overtime so that it will be 50% more efficient as compared to the 2004 version of the standard by 2030. This is important to note as the targets that are being proposed here may seem more aggressive than they are in actuality.

⁶ The term split review refers to the USGBC process whereby applicants are able to submit part of their application at the conclusion of the project's design phase (design credits and prerequisites), and submit the rest at the conclusion of construction (construction credits and prerequisites), thus completing two rounds of reviews. The split review is designed to help teams determine if the project is on track to achieve LEED certification at its preferred level as early as possible in the design process. The advantage of the split review is that the first review is more aligned with the permitting phase.

Long Term (10+ years)

Based on this plan, all building types will be required to achieve net zero by 2030. Staff should evaluate whether to continue to require LEED Gold in addition to the net zero energy requirement.

Contribution to Net Zero Objective

This policy update will build capacity among the development industry in energy efficient design and construction. Energy efficient new large developments will contribute to curbing increases in GHG emissions. This regulatory approach is a strong tool to demonstrate the City's commitment and leadership on greenhouse gas reduction.

Projected Greenhouse Gas Reductions

This policy, updated incrementally through 2025, is expected to generate up to 39,000 tons of greenhouse gas emissions reductions over the baseline growth estimates, primarily through the replacement of older, inefficient buildings with highly efficient green buildings.



39 000
tons

Summary

The Zoning Ordinance is a regulatory tool that Cambridge can use to incrementally require higher standards of green building and energy efficiency for large commercial projects. Projects are required to exceed the building code, and, further, to strive toward exemplary green building performance. While requiring LEED projects will deliver buildings that are greener overall, the prescribed LEED energy points will ensure that projects are being built to increasingly improved energy efficiency standards. Over time, the City can incrementally increase the stringency of the requirements of this tool to require improved energy efficiency and potentially renewable energy production. Ultimately, what is required by the ordinance should become business as usual for construction and substantial rehabilitation projects.

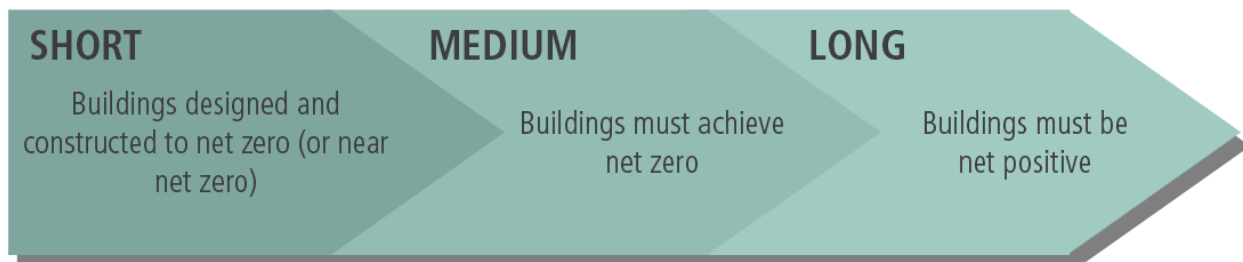
Key Actions

- Develop new and more robust administrative processes to accommodate the updated compliance process.
- Leverage green building requirements to foster capacity building among design and construction firms and greater owner acceptance of sustainability goals through education, training, and engagement.
- Engage with industry to allow lead time for stakeholders to understand new processes and requirements before the policy goes into effect.
- A communications package should be developed detailing future changes and the effective date.
- Foster an ongoing dialogue and capacity development through the sponsorship of workshops and net zero training programs.

Action 2.4 – Net Zero Requirement for New Construction + Deep Retrofits of Public Buildings

Introduce bold targets for new construction and energy performance improvements for existing municipal buildings.

To demonstrate leadership, establish a policy that new construction of municipal buildings target net zero or be ‘net zero ready’⁷ in the near term (see table above in section 2.1 for specific dates). This policy would also be applicable to “gut renovations” where a building is being completely renovated with new electrical, mechanical, interior, and envelope systems. For all other existing municipal buildings, the Task Force recommends introducing greenhouse gas reductions as a key component throughout the municipal improvement strategy and integrating it with other priorities, such as life safety, and accessibility.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Short Term (1-4 Years)

2.4.1. Net Zero Requirement for New Construction of Municipal Buildings

Establish a formal policy that new construction of municipal buildings should target net zero. Buildings must be designed to optimum energy efficiency standards such that all or a high percentage of energy loads could be met by renewable sources.

2.4.2. Renewal of Municipal Buildings

Develop a phased municipal building improvement strategy where (1) greenhouse gas reduction is a priority when constructing facility improvement projects and (2) operational improvements are implemented to achieve targets established and tracked by the Cambridge Department of Public Works. The strategy will involve continuous self-evaluation requiring increased performance levels as technology and local capacity is improved.

Medium Term (4-10 Years)

2.4.1. (Cont.) Net Zero Requirement for New Construction of Municipal Buildings

Once there is improved local capacity, all new construction should achieve net zero (target date 2020), five years ahead of citywide requirement.

2.4.2. (Cont.) Renewal of Municipal Buildings

Continue to implement municipal building improvement strategy that is informed by new technology and best practices, and track improvements (GHG reduction) annually.

⁷ ‘Net zero ready buildings’ is a term that typically applies to Net Zero *Energy* Buildings. Note that Cambridge is targeting Net Zero *Emissions*. Net Zero ready buildings achieve maximum energy savings (eg.: >80% more efficient than code requirement) and are designed to accommodate 100% of energy demand by on or off-site renewable sources, ‘Net zero ready’ recognizes that constraints such as site area or location may preclude access to renewable energy to meet 100% of energy demand.

Long Term (10+ Years)

2.4.1. (Cont.) Net Positive Requirement for New Construction of Municipal Buildings

Require new construction to be net positive, (i.e. producing more energy than it consumes on an annual basis) exceeding the citywide requirement for net zero buildings.

2.4.2. Renewal of Municipal Buildings

Continue to implement municipal building improvement strategy that is informed by new technology and best practices, and track improvements (GHG reduction) annually.

Contribution to Net Zero Objective

There is significant benefit to the City demonstrating leadership by committing to achieving net zero in its own building stock. This shows the City's commitment, demonstrates that net zero is achievable, will generate savings and chart a path to net zero for private industry.

Projected Greenhouse Gas Reductions



14 000
tons

Summary

To demonstrate what is possible and provide an example to building owners across the Cambridge community, the City should commit to all future projects being net zero or near net zero effective immediately. This will demonstrate a commitment to the net zero objective, and provide a showcase as to how to achieve energy efficient design.

Key Actions

- The City should formalize a net zero policy for municipal building projects.
- In future communication with City Council and the public on the Cambridge net zero project, the City should announce its own commitment to achieving net zero or near net zero performance in future developments.
- City staff should determine a clear definition of the target for new and existing buildings that can be incorporated into capital planning.
- Implement staff training on net zero design and construction to ensure the capacity to meet this objective exists.
- Future net zero projects should be selected, tracked and reported on as case studies, describing their design, the design process, the objectives relating to energy conservation and renewable energy. The case study will be a resource for the community.

Action 2.5 – Removal of Barriers to Increased Insulation

The purpose of this action is to resolve policy barriers with regard to improving insulation of buildings. One strategy to improve building efficiency is to increase the amount of insulation on the exterior of buildings. Because the addition of insulation effectively increases the footprint of a building and may incur into side yard set-back requirements, the Zoning Ordinance can introduce regulatory barriers to this retrofit. This action is to develop an approach to remove barriers in the Zoning Ordinance to enable the addition of exterior insulation with the purpose of improving the energy efficiency of buildings.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Short Term (1-4 Years)

Explore with advice from the Planning Board, Cambridge Inspectional Services the best method of allowing external insulation in built-out compact residential neighborhoods in a manner sensitive to historic preservation principles.

Medium Term (4-10 Years)

Evaluate the success of the policy changes. Interview stakeholders and review planning approval if necessary to determine if the barrier removal has resulted in the desired outcome. Revise strategy if required.

Long Term (10+ Years)

Evaluate the success of the policy changes over time. Interview stakeholders and determine if the barrier removal has resulted in the desired outcome. Revise strategy if required.

Contribution to Net Zero Objective

Given the Cambridge context for residential development, if many existing buildings are going to achieve net zero, there will be a need for buildings to increase levels of insulation. Adding exterior insulation is the quickest and generally the most effective way to achieve higher R-values for envelopes. Finding a way to easily add this insulation from an administrative perspective will be critical to the proliferation of deep energy retrofits and net zero new construction.

Projected Greenhouse Gas Reductions

Not
Applicable

Summary

Remove administrative barriers to the addition of exterior insulation in the residential context.

Key Actions

- Adopt or enact policy or administrative amendments to remove barriers to increased insulation in residential buildings.

Action 3 – Energy Supply

Action 3.1 – Low Carbon Energy Supply Strategy

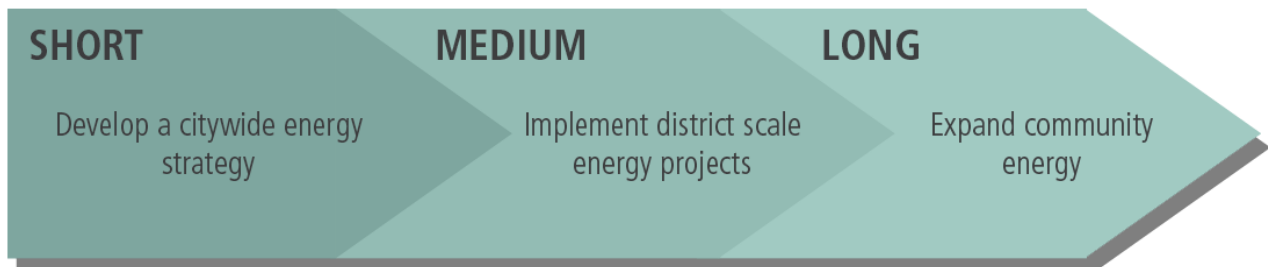
To achieve net zero and improve community resiliency will require a significant shift in the supply of energy to Cambridge buildings away from fossil fuel based sources and toward low- or zero-carbon sources. This will include realizing a significant portion of the city's solar potential (both PV and thermal), taking advantage of all opportunities to harvest waste heat, and expanding and developing additional district energy capacity. The objective of this strategy is for the City of Cambridge to define how it will support the broad implementation and development of renewable and low carbon energy in Cambridge. This includes identifying what role(s) the City can play in generation, distribution, and storage.

Additionally, the City will review what role(s) it can play in the procurement of more green power through lobbying the state to increase the Renewable Portfolio Standard and by reviewing the potential of utility aggregation as a tool to further increase the supply of renewables for Cambridge residents and businesses.

In order for the City to better understand the full potential of renewable energy and low carbon district heating in Cambridge, the energy supply strategy will determine what the potential is for generating heat and electricity at the block, district, and city scale and, where and how the city is best suited to support these applications.

The strategy will define:

- Where and how low carbon district energy can happen in Cambridge given current and emerging technologies.
- The role the City will play in developing and enabling district energy and distributed generation.
- Where and how the City and utilities could begin to modernize the grid infrastructure
- The full technical and economic potential for solar PV and solar thermal installations throughout the city
- The opportunities and potential for storage that improves resiliency and the potential to utilize more renewable energy
- The policies and investment strategies that should be employed to improve deployment of low carbon and renewable energy.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Short term (1-4 Years)

In order for the City to better understand the full potential of renewable energy and low carbon district heating and cooling in Cambridge, the City requires an energy supply strategy. The scope of the energy supply strategy is to determine what the potential is for generating heat and electricity at the block, district, and city scale is and where in the city is best suited for such applications. The strategy will also look at the capacity and constraints posed to developing

renewable energy with regard to the grid. This includes investigations in both smart grids and energy storage.

The scope of the strategy will include the following:

- Mapping of low carbon energy resources that could be developed into district energy (either new district energy systems and/or tied into existing systems);
- Identify opportunities based on both technical and business case analysis to develop district cooling – this will include the mapping of current and future heating demand and the capacity of the current building stock to adapt to district scale solutions;
- Identify opportunities based on both technical and business case analysis to either develop and/or expand combined heat and power at the block or district scale for micro-grids;
- In partnership with Eversource, map and provide technical analysis, with accompanying recommendations, on the constraints and opportunities posed by the current electrical grid with regards to its ability to integrate electricity from solar PV and co-generation;
- Perform a strengths, weaknesses, opportunities, and threats (SWOT) analysis of the various roles that the City can play with regards to the promotion and proliferation of low carbon renewable energy. These could include but not be limited to owning and operating systems or infrastructure, public private partnerships, franchise areas, and other enabling legislation;
- Policy options to support the development of low carbon and renewable energy;
- A review of City of Cambridge capital assets that could either support or integrate energy generation within them;
- Develop a solar road map, based on Cambridge's estimated solar potential and the incremental actions outlined in the evolution of a solar ready requirement.
- Prioritizing areas of investment for either generation, distribution or storage of energy;
- Review of investment vehicles that can be used to support the development of low carbon or renewable district energy;
- Review of how the market for technologies (solar, batteries, grid infrastructure etc.) is projected to change over the life of the strategy.

Medium term (4-10 Years)

Implement the key directions of the citywide energy supply strategy. The medium-term time horizon is the opportune time for City to consider developing or partnering on the expansion or development of district energy systems. This also the time horizon that a pilot for a small smart grid or block scale energy storage could be implemented.

Long term (10+ Years)

The development of larger smart grids and district scale energy systems could occur by 2025 and beyond. The city could also expect to see large-scale deployment of renewables and potentially city or public-private partnership owned solar installations outside the civic boundary by this time.

Contribution to Net Zero Objective

Roughly one-third of the emissions reductions the Task Force has identified for buildings can come from renewable energy generation. While the majority of this supply will come from the statewide Renewable Portfolio Standard (RPS),

there remains a significant opportunity to develop renewable energy both within the city and potentially on City-owned assets outside of Cambridge city limits.

Projected Greenhouse Gas Reductions

This strategy could achieve approximately 60,000 tons of avoided emissions annually. This estimate is based on the development of 90MW solar by 2030 and the development and growth of co-gen systems by 5% per year after 2020.



60 000
Tons

Summary

In order for the City to better understand the full potential of renewable energy and low carbon district heating in Cambridge, the City requires an energy supply strategy. The scope of the energy supply strategy is to determine what the potential is for generating heat and electricity at the block, district, and city scale is and to develop a roadmap for implementation.

The strategy will define:

- Where and how low carbon district energy can happen in Cambridge given current and emerging technologies and the trends that are apparent in both utility costs and technical innovation.
- The role the City will play in developing and enabling district energy and distributed generation.
- Where and how the City and utilities could begin to modernize its grid infrastructure
- The opportunities and potential for storage that improves resiliency and the potential to utilize more renewable energy
- The policies and investment strategies that should be employed to improve deployment of low carbon and renewable energy.

To begin, the City should commission a study to develop a citywide energy strategy in coordination with the Kendall square EcoDistrict stakeholder groups. With input from the utilities, the study should map both current and future demand for energy within the scope identified above under short-term actions.

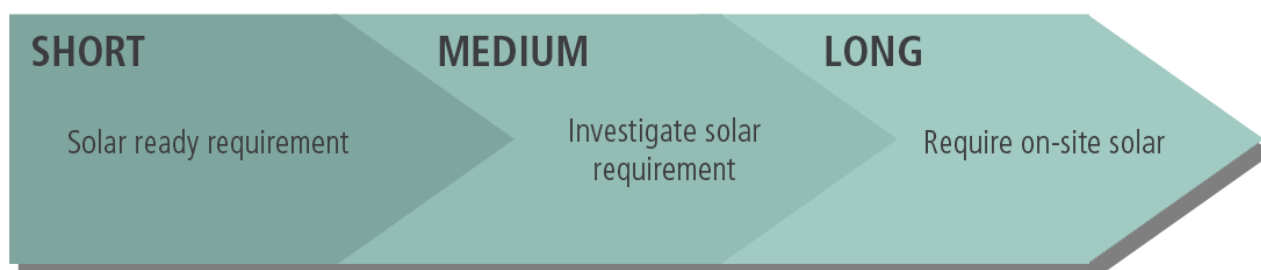
The findings of the study should be integrated into land use plans and other applicable policy and capital planning exercises. The findings should also identify partners and key development opportunities that can further catalyze the development of low carbon and renewable energy.

Key Actions

- Engage and develop a collaborative approach with utilities on energy supply objectives and their ability to contribute to an energy strategy. Address low carbon energy supply specifically under the proposed memorandum of understanding (see Action 3.3), and develop shared objectives and targets.
- Begin strategy with the scope outlined above in the 'Short Term Actions' (potentially in coordination with the Kendall Square EcoDistrict research)
- Conduct a detailed feasibility analysis to better understand the potential for large-scale solar on city-owned parcels of (vacant or under-utilized) land.
- Integrate the relevant outcomes of the Energy Strategy into city-wide planning efforts and capital planning strategy.

Action 3.2 – Rooftop Solar Requirement

Cambridge should introduce a requirement for onsite renewable energy generation, with a focus on solar. The action would begin with the exploration of a requirement that all roofs on new construction projects must be solar ready.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Short Term (1-4 Years)

Solar ready requirement

All new buildings should be 'solar ready' – designed to accommodate the installation of roof-mounted solar panels both photovoltaic and solar thermal. These requirements would include but not be limited too enhanced structural loading, pitch and orientation, a conduit to accommodate pipes and cables, and dedicated space in mechanical rooms. The requirements should be implemented with discretion in order to account for the ability of the roof to collect solar e.g. shading and large numbers of required roof penetrations would be considered. Solar access requirements could also be reviewed in the context of the citywide planning process to ensure that the long term viability of solar in various locations is known.

Explore solar requirement

Investigate minimum requirements for onsite solar installations on new buildings. Explore the feasibility and financial implications of a solar energy generation requirement, e.g. 5-10% of a given building's energy load.

Medium Term (4-10 Years)

Expand solar ready requirement

Undertake a feasibility analysis of applying the requirements for solar ready to major roof replacements.

Long Term (10+ Years)

Enhanced solar requirement

Investigate increasing renewable generation requirements.

Contribution to Net Zero Objective

The purpose of this requirement is to ensure that all new buildings, and potentially existing buildings having their roofs repaired, either have onsite solar generation or could easily be retrofitted at a later date.

Projected Greenhouse Gas Reductions

There are no direct GHG reductions associated with this action, however, it is an enabling action that supports local development of renewable energy.

**Enabling
Action**

Summary

This is a staged recommendation that proposes to start with a solar ready roof requirement that could lead to an eventual renewable energy requirement for new construction modeled after similar ordinances in Europe.

Ensuring that buildings are designed today to accommodate solar panels from a structural and access perspective will lower costs to retrofit these projects with solar later, and may also encourage some projects to implement solar roofs during initial construction where they may not have previously considered it.

The City should investigate and quantify the incremental costs for this requirement and review the findings with industry prior to recommending final adoption.

Key Actions

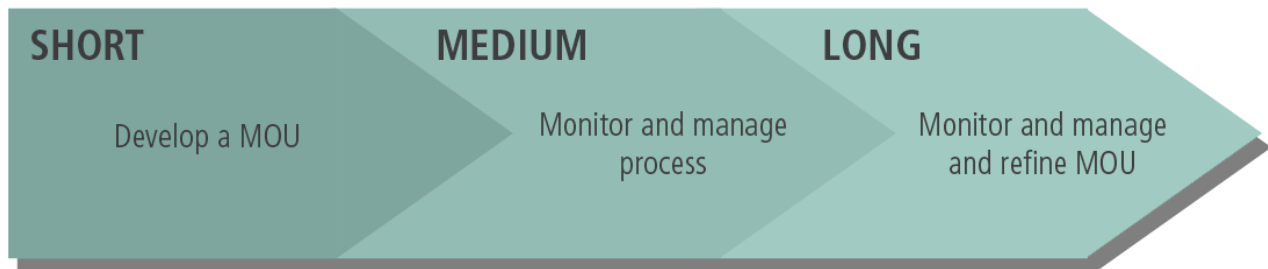
- Investigate and quantify the incremental costs for this requirement for both residential and commercial buildings
- Review findings with industry prior to recommending final adoption.
- Perform economic and engineering analysis on the development of solar energy requirements
- Explore development of thresholds for a solar ready retrofit requirement for major renovations

Action 3.3 – Develop a Memorandum of Understanding with Local Utilities

Taking action towards net zero emissions will require the City of Cambridge to work closely with the utilities specifically in the following areas:

- Investigating and piloting smart grid projects
- Investing in incentive programs
- Data sharing
- Investigation, development and expansion of district energy systems
- Interconnection issues that limit deployment of solar PV and co-generation
- Using solar PV to strategically address distribution congestion
- Work to increase resiliency of the electric, gas, and steam systems.

Where cities do not have the benefit of their own municipally-owned utility, cities can collaborate with utilities on projects of mutual interest that have resulted in energy use and emissions reductions. The declaration and definition of this collaboration can impact its effectiveness so a formal agreement on how the City of Cambridge, Eversource and Veolia can work together on the above noted areas is recommended.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Short Term (1-4 Years)

Develop a memorandum of understanding (MOU) based on areas of mutual interest and have senior officials meet regularly to monitor and manage progress. Explore if there is benefit to including the state government and regional partners to this collaboration.

Medium Term (4-10 Years)

Senior officials meet regularly to monitor and manage progress and further develop the MOU as new priorities and projects develop.

Long Term (10+ Years)

Senior officials meet regularly to monitor and manage progress and further develop the MOU as new priorities and projects develop.

Contribution to Net Zero Objective

The purpose of this initiative is to ensure that there is a framework and a common set of priorities and commitments that the City of Cambridge and the utilities can agree to, that support moving towards net zero, but also support improved working relationships between the parties.

Projected Greenhouse Gas Reductions

This is a foundational action that, while it has no directly attributable emissions reductions, will broadly support several strategies that will generate significant emissions reductions.



Summary

In order to better understand, plan and incentivize the reduction of GHG emissions in Cambridge's buildings there will need to be a strong working relationship with Eversource and Veolia, the two local utilities. Their expertise, data, and programs, and infrastructure will be essential to getting to net zero. To support efficient collaboration, the City of Cambridge and the utilities should develop a framework from which they can collaborate on programs of mutual interest and define how they can continue to work together as the pathway to net zero evolves.

Implementation

It is common for many cities to have structured relationships with their local utility providers that allow for collaboration on projects of mutual interest. It is recommended that Cambridge explore developing a memorandum of understanding with both utilities that addresses the flowing points of collaboration.

- **Investigate and pilot smart grid and micro-grid projects**
The investigation and development of smart grids will help guide Cambridge's strategy with regards to renewable energy generation in the city. Cambridge could serve as a test bed for smart grids, the learnings from which could be applied more broadly throughout Eversource's service delivery area.
- **Investing in incentive programs**
Current Eversource invests in incentive programs for building energy retrofits. The City could work with Eversource to further promote these programs, and potentially add to their effectiveness through programs built off of the building energy disclosure ordinance.
- **The further investigation, development and expansion of district energy systems**
Currently Veolia operates Cambridge's only private district energy system. The City could work with both Veolia and Eversource to look at ways to encourage not only connection to this system but also the potential development of other systems where appropriate and feasible. Co-exploration of how these strategies could help both parties achieve their goals should be explored.

While engaging the utilities, it may also be opportune to engage other key stakeholders such as the state and the federal government to see if there are ways that other resources can be brought to bear through collaboration.

Key Actions

- Formulate a list of objectives of a proposed MOU
- Meet with utilities to begin discussions of an MOU including content, structure and ongoing maintenance.

Action 4 – Investigate Local Carbon Fund

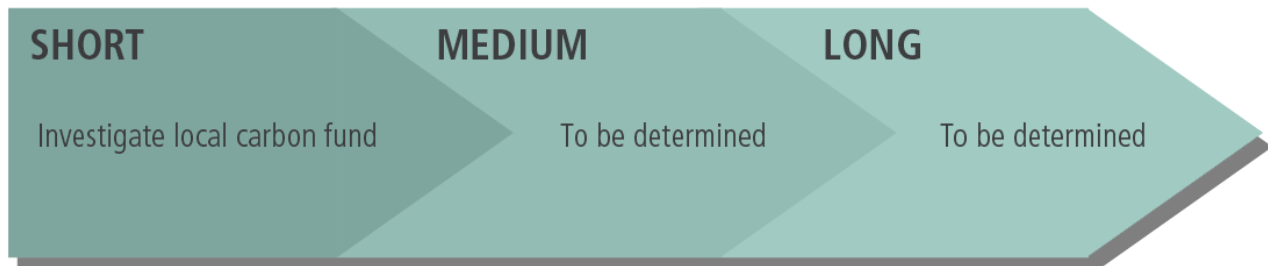
For Cambridge to become a net zero community, it will require an annual energy balance across the entirety of the city's building stock. To achieve such an objective will require radical transformation of the existing building stock and the introduction of aggressive standards for new construction combined with the proliferation of affordable renewable energy. Where it is not possible or is exceptionally challenging for individual projects to achieve net zero emissions through the combination of efficiency and renewable energy generation, an alternative approach is to introduce a locally managed carbon fund⁸.

A carbon fund would introduce the option, as an alternative to achieving net zero, to purchase carbon offsets on a voluntary basis. The money collected would go into a local carbon fund, the proceeds of which will support Cambridge-based greenhouse gas reduction initiatives and renewable or low-carbon energy projects. Ideally, a locally based carbon fund would be developed and operated independently or at arm's length of the City.

The objective of the fund should be to create a vehicle that is easy to use as an alternative method to achieve net zero emissions over the short and medium term. Administrative costs should be kept to a minimum to ensure the maximum proportion of the fund is invested directly into emission reduction project development.

The preliminary analysis should explore issues such as the development of a methodology for determining validity of offset projects. The offsets need not be "gold level" certified, but the accreditation methodology should be robust. For example, a program with defined parameters could qualify once but be used on several buildings. Further, in contrast to traditional offset frameworks, which typically are limited to supporting large-scale projects, a local carbon fund should be structured such that it can support a range of Cambridge-based emission reduction projects regardless of the scale of the project.

It is important to stress that the vision of a carbon fund initially is that it would be a voluntary tool that could be embraced by local stakeholders, who elect to invest in offsets in support of the net zero goal and in their local community.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Short Term (1-4 Years)

The associated fund should be developed with the needs of the real estate market in mind. The development of such a tool should be based on an economic potential study that weighs both the costs of robust carbon reduction strategies and the needs and constraints of the local development market. The price of offsets should be established such that an investment is both an attractive tool for the market and also generates actual reductions.

⁸ Note that the proposed carbon fund should not be confused with what is typically called a 'carbon tax,' which is a different tool both in structure and how the funds are used. The carbon fund will not interfere, nor will there be overlap with the proposed state level carbon tax (Massachusetts House Bill 2532), which proposes to charge customers \$5 per ton for carbon-based fuel.

After the market potential is established, the methodology of quantifying carbon offset projects needs to be tested to ensure that the approach is endorsed by key stakeholders and the Cambridge community at large.

Carbon offset schemes do not typically support development of green building projects (e.g. retrofits), as the scale of the projects tend to be too small to bear the financial and administrative burden of carbon accounting and verification protocols. The fund will need to define criteria to qualify project eligibility. A balance will again need to be struck between the legitimacy of the carbon offset projects and the burden placed on the offset developer to demonstrate the project's validity (e.g. "additionality" and ownership). To strike this balance and determine how such an initiative can be effectively brought to market, extensive stakeholder engagement for both the potential purchasers and benefactors of the fund is necessary.

Finally, it is crucial to define thresholds for contributions to the carbon fund to achieve net zero. This will include a methodology describing how the quantity of carbon offsets required to achieve net zero emissions is calculated. For example, some jurisdictions use the reasonable life of common mechanical systems such as boilers or HVAC units which is 10 years. This is also consistent with the reasonable lifespan of carbon offsets.

The contribution to this fund should be optional but recognized and endorsed by the City of Cambridge and other local leaders as a means to directly contribute to Cambridge's goal of net zero emissions for buildings. The Cambridge Climate Protection Action Committee and the Cambridge Sustainability Compact should be engaged to offer input on the development of such a tool.

Medium Term (4-10 Years)

The medium and long-term implications of these actions will be determined by the initial investigation of the tool's viability.

Long Term (10+ Years)

The medium and long-term implications of these actions will be determined by the initial investigation of the tool's viability.

Contribution to Net Zero Objective

The development of a carbon fund could serve two important purposes: (1) provide a mechanism by which projects, companies or individuals can achieve net zero emissions through the purchase of offsets; (2) it could be designed in such a way as to keep funds from the purchase of those offsets in Cambridge to catalyze the development of local renewable energy projects or energy retrofits. This new investment vehicle can help to develop a local economy based on reducing emissions from the built environment.

Projected Greenhouse Gas Reductions

While the GHG reduction impact of this action has yet to be determined, it could provide significant funds to invest in GHG reduction strategies and be a valuable tool to help projects achieve net zero emissions, and therefore could have significant impact.

High Potential

Key Actions

- Undertake economic analysis to determine carbon pricing, projected impact of a fund in terms of costs to industry and potential for fund to realize carbon savings.

Develop program design and solicit an existing third-party organization (or create a new organization) to administer the program.

Action 5 – Engagement and Capacity Building

The Task Force recommends the City continue to invest staff time and resources into identifying tools, innovative ideas, training opportunities, grants and other resources to support residents and commercial property owners in working toward this aggressive goal.

Action 5.1 – Communication Strategy

Develop a comprehensive long-term communications strategy around the Cambridge Net Zero objective. The strategy will ensure that key stakeholders including City officials, the building industry, and Cambridge residents remain aware of the progress toward net zero and engaged with the initiative as needed or desired.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Short Term (1-4 Years)

- Establish a communications network wherein partners and advocates use existing communications channels to engage the community around the net zero initiative. Partners with existing networks are trusted voices, whose endorsement can be invaluable in terms of generating support for the initiative.
- Develop (with the assistance of a public relations firm) a strong brand identity for the project such that the overarching project and related initiatives are easily recognizable by residents, visitors, and community members.
- A focus of this strategy should be to build upon the success already achieved to date in Cambridge and to celebrate the leadership of the very progressive development and real-estate community.

Medium Term (4-10 Years)

- Ensure that programs that rely on community uptake are communicated to their intended audiences in a simple and engaging manner. Program uptake is often closely tied to awareness and clarity of messaging.
- Maintain open channels of engagement with residents and businesses, such that their ideas are incorporated into the work, and their voices are heard.
- Use communications tools and campaigns to translate complex information to a format that is accessible and relatable to community members.
- Develop competitions, challenges and/or rewards program to generate buzz around net zero initiatives.
- Report regularly on progress toward target.

Long Term (10+ Years)

See medium term actions.

Contribution to Net Zero Objective

The purpose of the communications strategy is to ensure that Cambridge residents, businesses and institutions continue to be engaged in this community-driven net zero initiative, aware of the associated initiatives, and understand how they can contribute to the effort as building owners and occupants.

The City should develop a detailed staffing and resource plan for how they will support the community in this effort, and how they will efficiently and effectively execute on the ideas proposed in this report, and provide resources and support to the residential and business community around implementation.

Projected Greenhouse Gas Reductions

This action will generally ensure Cambridge remains on the trajectory toward achieving its target, however there are no directly associated GHG reductions.

Strategy
Support

Summary

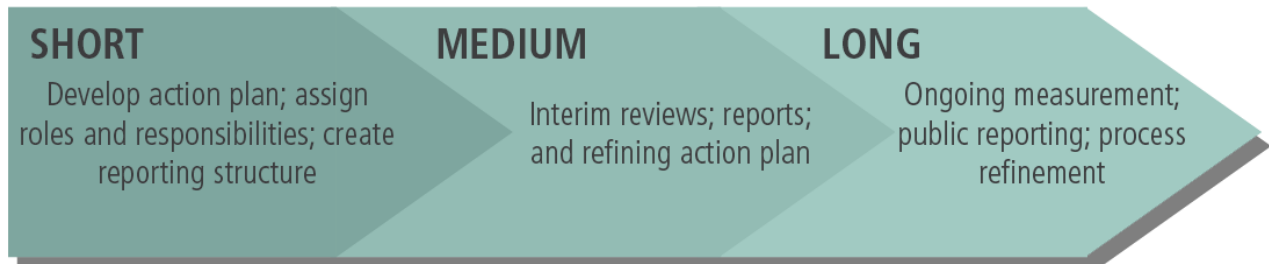
Meeting the net zero objective will rely on the commitment of a broad range of actors, allies, and individuals. To support the getting to net zero initiative, the City needs to continue to build the momentum generated in the first year of project development. The purpose of a communications strategy is to ensure that Cambridge residents are aware of the net zero objective and remain aware of the ongoing initiatives that support the City in achieving the objective. Ideally, the community should feel like they have a voice in shaping the path to net zero, and an effective communications campaign can generate support and a sense of ownership.

Key Actions

- Establish roles and responsibilities among Cambridge City staff and external partners
- Develop a communications plan to support project objectives
- Develop a brand to strengthen recognition of the Getting to Net Zero project and supportive actions
- Establish a communications network, engaging strategic partners and existing communications channels

Action 5.2 – Develop Ongoing Capacity to Manage Getting to Net Zero Project

Assign and commit to specific roles and responsibilities for implementing the Cambridge net zero initiative over the long term. This includes project leads for each of the early actions, identifying research and implementation partners, developing a reporting structure and a governance structure to ensure that the project remains on track and consistent.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Contribution to Net Zero Objective

It is essential that Cambridge develop capacity to manage the net zero initiative and remain on track to meet the objective. An effective road map must include regular incremental reviews, measurement and refinement such that programs and initiatives can evolve accordingly with political, economic, and technological changes.

Projected Greenhouse Gas Reductions

This action will generally ensure Cambridge remains on the trajectory toward achieving its target, however there are no directly associated GHG reductions.

**Strategy
Support**

Summary

While the Cambridge Net Zero Action Plan was completed by the Getting to Net Zero Task Force in early 2015, in the years that follow the initiative will be led by the City of Cambridge along with partners and community stakeholders. As such, it is essential that the initiative be resourced accordingly so that its objectives will be met over the duration of the project.

Key Actions

- Assign roles and responsibilities of City departments, committees, and external partners and stakeholders
- Develop a structure to measure and report annually on progress toward the net zero target. Specific programs and initiatives should, in turn, be refined based on uptake and return on investment. Select a tool for ongoing monitoring and reporting, such as a web-based dashboard
- Develop governance structure (e.g. Cambridge's Climate Protection Action Committee responsible for ongoing oversight) to ensure ongoing review and comprehensive reviews of the action plan at a minimum every five years.

Action 5.3 – Net Zero Lab Standards

Engage with stakeholders such as lab tenants, lab developers and owners, and the universities to develop new standards for lab operations that support lower energy use. Building on Cambridge's strength as a center of research and innovation, the development of new industrial hygiene standards that, for example, could lower ventilation standards and reduce other energy uses could be critical in achieving net zero labs.



It is recommended that the City study the feasibility, costs and benefits of the below set of proposed actions.

Short Term (1-4 Years)

Develop a working group of industry stakeholders, research institutions and industrial hygienists to collaborate on new standards for reducing energy use that can be trialed without compromising safety or research integrity.

Medium Term (4-10 Years)

Once the consensus is developed on new potential standards there will need to be pilots to test their effectiveness of the interventions and refined.

Long Term (10+Years)

Over the long term there will be a need for ongoing refinement of the standards as technology and practices develop.

Projected Greenhouse Gas Reductions

While there are no specific GHG emissions projected for this action there is potential for substantial reductions in both new and existing lab buildings that will support and enable reductions captured in Actions 1 and 2.

Strategy
Support