CLIMATE CRISIS WORKING GROUP FINDINGS AND RECOMMENDATIONS

March, 2022

"Code Red for Humanity" - IPCC

"Cambridge building emissions UP instead of DOWN as intended and planned."

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Acknowledgment & Dedication

This report is dedicated to the hundreds of Cambridge residents who have worked over the years to push Cambridge to address the climate crisis in a meaningful way. From convening climate congresses and plenaries and seminars to volunteering hundreds of hours engaging in thoughtful comprehensive educational efforts to strong and forceful advocacy, these residents have consistently worked to make the city a leader. Some people have been writing and speaking for decades, others for far shorter. All share a passion for change, a conviction that Cambridge must stand up and be a role model, and a deep-seated and growing concern about the implication for our city (and the world) of our lack of progress in reducing emissions and mitigating the impact of the already changed and changing climate. The crisis is with us; it is accelerating. The CCWG seeks to accelerate Cambridge's effectiveness in climate action and become a leader in impact, not only intent. The CCWG honors all the work that has been done and the people who demand greater urgency and bold action.

Introduction

The Climate Crisis Working Group was convened by Mayor Sumbul Siddiqui with Councillor Patty Nolan to build on the city's work on climate. The main goal of the group is to increase the urgency of our climate actions and the impact of that work by providing guidance on how Cambridge can better address the climate crisis. The need for greater urgency was made exceedingly clear by the recent Net Zero Action Plan 5-year Impact Evaluation Report, released in December of 2020, which concluded that the City will have to accelerate emissions reductions twentyfold over the next ten years in order to meet our goals. That sobering assessment means immediate action is needed. Despite more than twenty years of climate efforts, with multiple worthy initiatives, citywide greenhouse gas emissions have remained relatively unchanged since 2003. Though some of this can be accounted for in Cambridge's growth, other entities with similar expansion have had some success in reducing emissions. It was time to take stock and see if a group of relative outsiders - most of whom had not been directly involved in city climate efforts - could come up with some useful ideas.

Our goal was to provide input and guidance to the City Council and the administration by reviewing climate work within the city, building on existing efforts, consulting with community advocates, and soliciting input from the group members. The working group sought to identify ways to accelerate progress and develop a list of targeted actions for the City to implement. From the beginning, the goal was to make sure the output of the group was not a report to put on a shelf, but a guide for a new approach to climate work. The city has enough reports and lists of actions to take. We need a culture shift, and financial investment to match the need. ***We see the value added of the CCWG to the stellar climate work done over the last two decades is our willingness to call out and identify lapses in program implementation, effectiveness and the general lack of progress. In response a key recommendation is to propose a culture shift.***

The CCWG met six times during the fall of 2021, all remotely due to the COVID-19 pandemic. Find short meeting summaries below, with full meeting slides available in the appendix.

Meeting 1 - September 1, 2021
The first meeting started with a welcome message and an introduction of the members. Meeting discussion covered: an overview of the CCWG's goals, a quick review of the City's previous climate actions, successes, and failures, and a discussion of future meetings and next steps.

Meeting 2 - September 15, 2021
The meeting began with a review of the CCWG work plan and discussion of any necessary edits. Then, the rest of the meeting was devoted to identifying key actors in Cambridge's climate goals, actions they may take, and discussion ended up centered on the concept of focusing on potential barriers to carrying out climate actions.

Meeting 3 - October 13, 2021
During this meeting, the CCWG reviewed the City's past and current climate actions, focusing on where they succeeded or failed to meet the goals. The CCWG then reviewed why certain initiatives succeeded or failed, which barriers they faced, and brainstormed ideas to overcome these barriers.

Meeting 4 - October 27, 2021
At this meeting, the discussion started with a review of the recently released Net Zero Action Plan 5-Year Report, then summarized the CCWG's top ideas to date. The group discussed and narrowed down feasible goals to 3-5 ideas, then broke into smaller groups to create action plans for these ideas.

Meeting 5 - November 17, 2021
At the beginning of this meeting, the Group reviewed the goals that had been established at Meeting 4, then reviewed the Building Energy Use and Disclosure Ordinance (BEUDO) draft amendments (with presentations by city staff and CCWG members) and discussed reactions. The meeting concluded with compiling a list of smaller, simpler action items to complement the main goals.

Meeting 6 - November 30, 2021
The last meeting was largely devoted to discussing and refining some recommendations with acknowledgement that the work was not done, but that the conceptual framework of barriers and focus on ensuring impact was helpful. There was some discussion of the final product and next steps.

Task Force Members

Mayor Sumbul Siddiqui
Councillor Patricia Nolan
Audrey Schulman *(Co-founder and co-executive director of HEET)*
Ben Hellerstein *(State Director, Environment Massachusetts)*
Carol Lee Rawn *(Senior Director of Transportation, Ceres)*
Connor Rockett *(New England Forestry Foundation)*
Cynthia Hibbard *(CDM Smith, Green Cambridge)*
Daniel Mascoop *(Sunrise Boston)*
Dr. Gaurab Basu *(Cambridge Health Alliance, Harvard Medical School)*
Justin de Benedictis-Kessner *(Assistant Professor at Harvard Kennedy School)*
Lyn Huckabee *(State of Mass. Energy Efficiency Program Manager and member, CPAC)*
Malcolm David Bliss *(SVP of partnerships Common Energy)*
Margery Davies *(Mothers Out Front and member Net Zero Action Plan 5-year review task force)*
Michael Scarlett *(Mayor's Chief of Staff)*
Susanne Rasmussen *(Director of Environmental and Transportation Planning, Cambridge Community Development Department)*

City Staff:
Adrienne La Forte *(Aide to Councillor Nolan)*
Seth Federspiel *(Climate Program Manager, Cambridge Community Development Department)*

Cambridge Climate History & Next Steps

Cambridge declared a climate emergency over a decade ago and has been actively working to address the climate crisis for more than twenty years. ***The city has taken some important steps, yet is behind on overall climate goals and has consistently missed the mark on both citywide goals and deadlines.*** CCWG group members, all of whom have a strong awareness and understanding of the climate crisis, believe Cambridge can and should be a leader on climate action and climate justice. And the city is not living up to its potential.

Over the course of six meetings, the CCWG covered a lot of ground and wrestled with the question of how to make the extensive climate work in the city more effective. ***The starting point and inspiration for the CCWG was a sense that the city is underperforming in terms of its climate goals, but has the potential to be a climate leader.*** Reviewing the data on citywide climate goals, projects, and plans leads to the conclusion that despite a lot of good work, Cambridge is not doing enough and is not working effectively or smartly. To date, the city's impact on the reduction of citywide emissions has not been sufficient; therefore, a critical review of the overall body of work is warranted, with an attempt to understand the necessary change for greater effectiveness. Our goal was to review the major areas for potential impact, seek to affect the sense of urgency, and produce recommendations for the City.

During the course of our work, three questions guided our thinking: What are the city's greatest successes and what facilitated them? Where is there a lack of progress or unmet goals and how can our understanding of certain barriers help re-shape the city's actions, policies, priorities, and culture? What can the city do to make more progress?

The CCWG was formed and members agreed to serve because of a shared belief that the city's efforts have not been effective enough. The city administration has many sound plans and has committed substantial talent and resources to them. However, we are still falling behind our targets and failing to reach our goals. Our central question asks why, and is there some way to address that shortcoming - or is it inevitable given the scope and scale of the challenge? In some areas Cambridge has been a leader and used as a model by other cities and towns. In other areas other cities and towns are ahead of Cambridge and can serve as a model for our future actions.

The consensus of the group is that in order to make progress - and for the CCWG to deliver on the promise of positive impactful disruption - it is

critical to avoid the trap of collecting ideas and creating yet another plan that, although solidly full of good ideas and intentions, still does not move the needle. Cambridge has many reports and plans related to climate action including many with specific action steps and deadlines. Based on our discussions and work, the recommendations come at two levels. ***First, an overarching primary recommendation is to address barriers to success. These barriers are: the cultural mindset around climate, lack of funding, an aversion to mandates, and structural challenges. The second level of recommendations are specific recommendations for actions to take, many of which are already underway in the city.***

The seven identified recommended action areas build on existing work and urge more decisive action, with accelerated timelines. To sum up the approach that needs to be taken: Cambridge - all parts of the city and the community - needs to act as though the climate crisis is the emergency the city declared a decade ago. The COVID-19 response showed that rapid change can happen when facing an emergency, and the city's recent response to the affordable housing situation also provides a model: direct funding for affordable housing doubled to over $30 million in the last two years and almost tripled over the last decade. It is in keeping with these models of how to act in the face of an emergency that we present these recommendations to the City Council.

Without addressing the barriers that have stymied effective action, progress will continue to be slower than what is possible and desired. That means working to change a mindset that has contributed to slower progress than is possible and desired, use mandates - along with stronger incentives - to achieve results, and fund climate efforts commensurate with the need. The recommended actions to be taken are feasible, although some will engender pushback (especially in terms of timelines and breadth). The City - both the City Council and the administration - will have to stand firm if Cambridge's climate leadership is to be asserted.

Identifying & Addressing Barriers to Success

The original goal of the CCWG was to be bold and disruptive in coming up with an action plan which could lead to impact on the city's multifaceted and deep work on climate issues. It was clear from the first meeting that many climate actions and steps were already underway, being discussed, studied, proposed and/or prioritized by several groups. For the last twenty years. So why hasn't there been more progress? Of course there are many reasons that are real: the issue is daunting, the challenge great and moving the needle on reducing emissions and changing the trajectory of climate disaster is monumentally difficult. However, there are signals and some evidence that more progress could have been made - based on the experience of some players, notably the city itself in its operations and two major institutions in the city - Harvard and MIT. All three of those entities have reduced emissions and made more progress towards meeting climate goals than the city as a whole.

There is something the CCWG identified that could help: our value added from our work is a recommendation to put as much focus on WHY things haven't panned out - as on identifying and prioritizing actions to take. That approach of directly addressing the roadblocks and barriers - in order to understand and remove, not to dwell on them - has not been as central to climate work as we think it should be. The CCWG kept coming up against the need to identify and directly address barriers if the city is to successfully meet the climate crisis challenge. There are structural barriers that limit ability to make changes - many of which can only be resolved at the state or even federal level. The CCWG acknowledges those and encourages the City administration and City Council to push for changes whenever possible to address the structural barriers at those levels. In addition to recognizing the importance of addressing structural barriers, the CCWG identified three other sets of barriers that collectively inhibit effective climate action.

At the heart of the discussions were two themes: Cambridge needs tangible results with a focus on environmental justice, since the climate crisis in all its manifestations most adversely impacts vulnerable populations. And a key to success over the next few years is to consciously and intentionally address the barriers the City can affect directly: Mindset, Mandates and Money.

Mindset: A culture change is needed.

- ◊ The acknowledgement of failures is as important as the celebration of successes.
  - Too often, failure to meet goals is not acknowledged, leading to continuation of a status quo which hasn't worked.
  - Not communicating lapses leads people to not knowing that change is needed and thus less urgency to adjust actions.
- ◊ Accountability and oversight are needed. And full transparency.
  - Timelines - the City must create a mechanism to monitor deadlines since climate deadlines have been consistently missed. Adjusting goals is sometimes necessary, yet deadlines should not be ignored. And when a goalpost is adjusted, it should be public, which builds trust.
  - Implementation - there should be a way to measure if implementation occurred as planned, so we can celebrate the climate successes and adjust when off course.
  - Results/outcomes measuring - there should be a centralized system to monitor and measure results of climate initiatives in more depth than the Sustainability Dashboard, which has few goals and outdated results. Limitations in data access and measuring outcomes should be fixed. Responsibility for results must be clear. Outcomes must be consistently reviewed and updated.
  - Openness - A lack of transparency has hindered progress and participation.
- ◊ Inclusive open process of gathering and using input from all stakeholders must become standard - required.
  - The Climate Protection Action Committee (CPAC) has been underutilized, left out of key discussions and has no authority to effectively oversee the areas it is charged with overseeing.
  - Engage and use community experts - respecting, listening to, and following advice from a larger group will improve outcomes.
  - The authority of certain groups, like the Net Zero Action Plan Task Force (NZAPTF), activists, and residents should be better defined
- ◊ Evaluation of program design and effectiveness needs to be clear, timely, open and honest. Many programs have been started and time spent on climate initiatives which then fade away with not even a report that can inform future work [Example: the Georgetown Climate Prize effort.]

Mandates: Carrots need to be bigger and more flavorful AND used with sticks to get the desired results.

- ◊ BEUDO is a prime example of how there was not much incentive to change behavior, or direct support in the form of funding or recognition. And exposure of emissions wasn't sufficient - and climate leaders were not recognized. Now requirements are needed and should be enforced through rules and regulations along with strong incentives. Effort went into the collection of data and time spent by the city and property owners to report, with BEUDO itself having little impact on reducing emissions - those property owners working on reduction were already engaged. [See below for update to BEUDO.]
- ◊ Examples of necessary mandates include:
  - Transition point electrification: This could be a game-changer and should be developed as soon as possible.
  - EV use and charging, bicycle, and public transit infrastructure should be required more widely.

Money: Investment needs to match the challenge.

- ◊ Major investmentment is needed to make the city an environmental leader
- ◊ Ideas with potential for meaningful impact:
  - Fund and leverage Eversource programs to create a GeoGrid demonstration in Cambridge. Cambridge should explore how to be a pilot site by partnering with Eversource or outside funders. Perhaps use a third-party installer who funds the project and owns the infrastructure. HEET is hosting a meeting with interested municipalities in April or May to allow them to consider both options. Invest in a Virtual Power Purchase Agreement (VPPA, as MIT did in 2016).
  - Use PACE or another mechanism to enable financing for heat pumps and/or solar panels for residents, especially low income residents. If city funding mechanisms cannot be used, pursuing outside funding should be a priority.
  - Invest in EV, bicycle, and public transit infrastructure and incentives across city operations and for all residents, visitors and employees.

Recommendations

Below are seven recommendations - which are appropriate areas of focus for and action by the city in the near term. These actions are mostly items drawn from the work of other city climate groups, notably CPAC and the offshoots of NZAP and CRZTF and Mothers Out Front, Green Cambridge and 350MA Cambridge. Some actions were identified through the CCWG and have not been part of the CPAC work - although the city has worked on some items outside of CPAC and other climate groups. There are many other ideas, actions, and initiatives identified by CCWG members as worthy of effort and pursuing which could be included in future climate work. The CCWG could not cover them all in the short amount of time. There may be some possibility for group members to continue the work in some form. It is important to note, though, without the changes in mindset, mandates and money summarized above, these actions are not likely to yield the desired impact.

1. BEUDO Amendments Performance Requirements: strengthen, implement:

In the City of Cambridge, energy use in buildings accounts for the majority of greenhouse gas emissions -- about 80%, compared to most cities where buildings represent about half of emissions and less than half nationally and globally. In response to growing concerns about energy use and climate change, the Building Energy Use Disclosure Ordinance (BEUDO) was enacted by the Cambridge City Council on July 28, 2014. This ordinance requires owners of larger buildings to monitor and report annual building energy use to the City. This data is then categorized and made available on the Cambridge Open Portal. The intention of this ordinance was to make energy and water use data publicly available, so that various users such as potential property buyers, tenants, realtors, and others can make informed decisions, hopefully incentivizing building owners to reduce energy usage in their building stock. However, it is now clear that energy use disclosure is not enough, and ordinance amendments[1] to introduce performance requirements are currently under consideration by the City Council as contemplated in the original ordinance.

The proposed ordinance amendments require not only disclosure of building energy use, but establish a schedule

[1] See appendix for ordinance amendment text

for reductions in GHG emissions. As written the CCWG believes the draft recommendations fall short of the actions necessary to meet the challenges of the climate crisis. Currently, the amendments require each BEUDO property to comply with Greenhouse Gas Emissions requirements over a course of 6 compliance periods, resulting in net zero emissions in 2050. The CCWG recommends that this timeline be accelerated, with net zero reached by 2040 at the latest. And that all new buildings within the scope of BEUDO be required to be net zero immediately. This goal is in line with a policy order passed by the City Council in 2017, calling for 100% clean and renewable energy in the building and transportation sectors by 2035. Additionally, the amendments should be changed to add a requirement that outliers which use significantly more energy than other buildings must reach a certain baseline within the first few years. In other words, there should be a threshold that all BEUDO covered buildings must meet by 2025, then start their emissions reductions plans from there. This would ensure that buildings which already meet the threshold are not exempt from reducing emissions -- they will still stick to the emissions requirements under the compliance period schedule -- but large emitters will need to catch up to them.

RECOMMENDATION: Amend BEUDO along the lines of the city proposal, with stronger elements: Shorten the timeline for net zero, ensure the highest alternative payment is required, bring outliers' emissions down faster.

2. CCE Changes: higher RPS for the standard offering, including community shared solar:

The Cambridge Community Electricity Program (CCE) is an electricity aggregation program authorized under MGL XXII, Ch. 164, §164 that opts-in residents to electricity supply selected by the City via City procurement process. CCE provides consumers with two options:, Standard Green and 100% Green Plus. Residents and businesses on Basic Rate are automatically enrolled in Standard Green, which meets the minimum Massachusetts renewable energy requirements, including 20% from "premium" renewable energy sources in New England (MA Class I RECs). In contrast, 100% Green Plus offers 100% of electricity from "premium" renewable energy sources in New England (MA Class I RECs), while also purchasing MA Class I RECs to achieve 100% renewable energy. Customers can also choose not to participate in the CCE program and opt down to Eversource basic service or dozens of other suppliers.

Cambridge CCE participation rates show that most people stay in the default program option - Standard Green. Very few people opt out of the supply selected under CCE by the City. One issue is that for all new accounts, it takes a while for the account to be part of CCE. Only about 5% opt up to 100% Green Plus. Given inertia and the fact that it takes action, no matter how easy, that low percent is not surprising. However, since Cambridge perceives itself as a climate leader and enormous effort went into trying to get people to opt into 100% Green Plus, this program is an example of a communication and action strategy that did not achieve the desired result. The communications efforts on this have yet to be evaluated and assessed, which might help guide future efforts in other areas.

Other cities and towns have different program offerings; conversations with representatives from the cities of Somerville, Natick, Newton and Boston have documented that most customers stay in the default option, while a small number opt up or down. The difference, though, is that Cambridge's default option has a low percentage of renewable energy compared to other municipalities (see Fig. 1, Fig. 2 in Appendix B). The city touts that the number opting in to 100% renewable option has doubled, but with only 5% participating, the city's use is not significant enough to be making as much difference as other municipalities with a much higher RPS. Cambridge's current standard offering is the minimum percent renewable energy required by law. While there is an addition of 0.2¢ (2/10 of a cent) that goes to onsite renewable energy in Cambridge, this adder generates relatively little funds - about $650K/year. RECs in New England are priced at the point where they make a difference to the greening of the grid -

which is the point of RECs. Collectively the community aggregation programs in municipalities across Massachusetts are affecting the addition of renewables onto the grid. Cambridge can and should do more to contribute to that effort. In fact, Cambridge's first CCE plan was described as greenwashing in a report published by the Green Energy Consumer Alliance review in 2020 of community electric aggregation in Mass[page 19]:

The CCWG recommends that the CCE program amend the default program option and follow the lead of other cities and have three tiers. A standard offering ("Standard Green") which is the default with a much higher RPS than the minimum, a basic offering meeting the minimum Massachusetts renewable requirement, and a 100% renewable offering. The Standard Green should at least match surrounding municipalities. Standard (default) offers for other cities as of summer of 2021 are as follows:

- Lexington - 100% renewable
- Newton - 80% renewable
- Watertown - 53% renewable
- Worcester - 38% renewable
- Natick - 31% renewable
- Boston - 28% renewable
- Somerville - 28% renewable
- Cambridge - 18% renewable = state minimum required

In addition to being able to opt-in residents to City-selected electricity supply, state rules governing CCE also allow the City to opt-in residents to Community Shared Solar (CSS) under the Solar Massachusetts Renewable Target ("SMART") program. The CSS program delivers electricity to the grid from solar farms across Massachusetts creating new sources of clean electricity and supporting development of the solar industry in Massachusetts. CSS reduces electricity costs and the SMART program makes additional savings available to low income households. LICSS is currently operating and details are being worked out with DPU on including in aggregation programs. It is expected that soon the City can opt-in low income households without any outlays on the part of the City or residents, no use of space within the City, no use of City land, and no installation on the property of the City or its residents. City of Boston is working with DOER and DPU to use its CCE program to enroll 20,000 low income households in Boston in CSS. CCWG recommends that City of Cambridge join with City of Boston working with DOER and DPU to take advantage of this opportunity provided to municipalities under state law (M.G.L Title XXII Ch. 164 §134).

RECOMMENDATIONS: 1) For Cambridge to be a climate leader, we must offer a higher percentage of MA Class I RECs in our Standard Green option. The CDD should either increase the default (standard) RPS to 80% renewable or copy Lexington's

model of a standard offer at 100% renewables not in New England which is very close to Cambridge's 18% renewable price, and an opt-up option of 100% Renewables in New England. 2) Follow Boston's example by using CCE to opt-in low income households to develop new clean energy sources and simultaneously reduce energy burden for low income households without outlay on the part of the City.

3. Solar: City should invest in a VPPA, expand community solar:
The Cambridge Community Development Department is currently exploring the possibility of signing a Virtual Power Purchase Agreement (VPPA) as a way to off-set the city's emissions. With a VPPA, Cambridge would invest in a distant, off-side solar installation that reduces carbon emissions by displacing dirty energy in the host region, and may result in a positive economic return to its owners/financers from the sale of electricity. MIT and many other institutions have done VPPAs - even if a VPPA is just one step towards 100% renewable energy, it is a proven way to move the needle and contribute to a greener grid. The CCWG enthusiastically supports this idea.

The CCWG notes that on-site solar generation for all city properties - residential and commercial - is an important way every resident can be part of the solution. The CEA has been working to make headway in getting 1-4 family homes to install solar, and a report on the CEA's effectiveness is underway and could be valuable in determining how to ramp up those efforts. The installation of solar is challenging, and those homes collectively generate less 15% of citywide emissions. However, with the need for electrical capacity and the inevitable huge increase in demand for electricity, every possible clean-energy addition to the grid, including small-scale onsite solar should be pursued. And, it is a solid way for those residents to contribute to solutions. Cambridge should support the development of clean energy and reduce energy burden on low income households at no cost by enrolling low income households in community solar. By having all low income households be automatically enrolled, all would benefit.

RECOMMENDATION: For City properties, the CCWG recommends that all City properties utilize on-site solar power generation. Additionally, City meters should be enrolled in the Community Shared Solar (CSS) available across the State since 2014 and now operated under the State's' SMART program - this would both save money and increase energy efficiency of municipal properties. Additionally, the City should opt-in low income households to CSS under CCE as described above... This way, Cambridge would benefit from facilities that have already been built by private companies under the State's SMART program without any investment or installation.

4. Transportation: Incentivize non-auto transportation through evidence-backed strategies to encourage mode shift, and accelerate electric micro-mobility and auto options.

Transportation is the second largest source of emissions in Cambridge and the largest source statewide. In addition to reducing emissions, helping people moving through Cambridge transition away from cars as a primary form of transportation would reduce deaths and injuries resulting from crashes, traffic congestion, noise, and air pollution (which has a disproportionate impact on low income neighborhoods). Critical to achieving mode shift is both incentivizing safe mobility options for all citizens of Cambridge that serve as viable alternatives to private vehicles, alongside disincentivizing private vehicle usage. While Cambridge does not control every road within the city limits and many commuters simply travel through Cambridge, there are concrete steps that can be taken in the immediate term that would reduce transportation emissions and make Cambridge a safer, greener, healthier, and more equitable City.[2]

RECOMMENDATIONS: See below for a list of specific recommendations from the transportation experts within the CCWG:

Establish a City-wide goal of more people walking, rolling, and taking public transportation rather than using single-occupancy vehicles in all citywide planning.

- ◊ Incorporate explicit evaluation criteria in zoning, private development, and public engineering that prioritizes the needs of people walking, rolling, and using public transportation.
- ◊ Incorporate private vehicle lane reduction and parking reduction whenever possible to disincentivize solo-occupancy driving and better use public space.
- ◊ Use the model of Mobility as a Service (MaaS) to advance a unified clean transportation strategy. Where possible, collect best-practices data on transportation usage in order to better meet transportation goals (and interim goals) for Cambridge.

[2] Cambridge should consider developing a Car Master Plan to quantify how much of city's resources and land are devoted to car use, understand the impact of those choices on their most vulnerable residents, and commit to strategies for change.

Advocate for authority to establish car-free and low and zero emission zones to reduce emissions and inequity in air quality and encourage economic growth in business areas of the City.

- ◊ Where viable, conduct small-scale quick-build pilots of car-free zones in commercial areas of heavy pedestrian use and evaluate their impact on safety, customer transit choices, and business revenue.
- ◊ Evidence shows that cycling and pedestrian infrastructure improvements can benefit businesses, especially small businesses.[3] 2 Establish a city-funded business training program to work with local businesses to take advantage of new opportunities associated with increased pedestrian and cyclist traffic. Work with the state to move forward and seek funding from both federal (e.g. ARPA, US DOT's SS4A, DOE) and state (e.g. MassDOT's Complete Streets Program) sources to implement these zones as possible and encourage vehicle electrification.
- ◊ Better manage business delivery[4] and curb space. As heavy duty vehicle deliveries increase air pollution, traffic, and safety risks, the city should launch pilot programs focused on emission free delivery, such as the utilization of cargo bikes.[5] In tandem, the city should increase anti-idling efforts through increased automated, unarmed, or civilian enforcement. Explore support for small urban fleet electric truck leasing (as L.A. has done).

Expand bike and pedestrian infrastructure with the goal of reducing single-occupancy vehicle usage, increasing safety for all users and especially for Black and Hispanic residents,[6] providing public health benefits and improving quality of life for all residents, optimizing public space for the benefit of all, and reducing GHG emissions.

- ◊ Evidence shows that the biggest barrier to uptake of cycling as a form of transportation and other micro-mobility options is the (often correct) perception that these modes of transportation are unsafe due to a lack of protection from drivers of cars. Protected cycling infrastructure

[3] A 2019 city survey of Porter Square customers found that 62 percent of shoppers walked to businesses. A third drove, and 16 percent arrived by bicycle.
[4] Urban deliveries are projected to increase 78% by 2030, increasing emissions by 30%.
[5] For example, URB-E is carving out a high-density niche in the market for electric commercial vehicles, which market intelligence advisory Guidehouse Insights says is expected to hit $370 billion by 2030. They want to build an ecosystem around cargo e-bikes, aiming to expand from 50 to 500 of them by next year.
[6] Recent research indicates that fatality rates per mile traveled are 4.5 times higher for Black Americans while cycling and and 2.2 times higher while walking than for White Americans. Matthew A. Raifman and Ernani F. Choma. 2022. "Disparities in Activity and Traffic Fatalities by Race Ethnicity." American Journal of Preventive Medicine. https://doi.org/10.1016/j.amepre.2022.203.2012

substantially improves perceptions of safety, which can lead to further uptake of non-car transportation.[7] To encourage walking and rolling for all types of trips in Cambridge, the City should ensure that whenever possible the cycling and pedestrian infrastructure is improved or maintained in a way that increases the safety of users. This includes adding and maintaining physically protected cycling infrastructure, but should also include widening sidewalks and other traffic-calming measures that have been shown to slow vehicle speeds and increase safety.[8]

◊ Invest in additional bike parking infrastructure in commercial and residential areas to enable more residents to own and use bikes.
  - The city should conduct a comprehensive assessment of bike parking infrastructure along with any assessment of car parking infrastructure in the city. To the extent that current bike parking is shown to be oversubscribed, additional parking should be provided.
  - Public bike parking should be installed in residential neighborhoods where there is data to indicate a lack of indoor bike parking within private residences.[9] The City should explore options like secure bike parking pods and helping residents store larger cargo bikes, making biking accessible to people with disabilities, and outlets to charge e-bikes.
  - Minimum bike parking requirements at most non-residential developments; public bike parking should be installed in commercial zones to encourage zero-emissions transportation for customers of Cambridge businesses and stimulate economic growth for the city's local businesses. Such parking is space-efficient and as such should replace private on-street car parking where there is limited physical space on sidewalks.

◊ Expand BlueBikes infrastructure such that all residents of Cambridge have easy access to public bikes.
  - The City should purchase and provide space for the installation of additional bike share equipment such that every Cambridge resident lives within a 5-minute walk of a BlueBikes station. In

[7] Nathan McNeil, Christopher M. Monsere, and Jennifer Dill. 2015. "Influence of Bike Lane Buffer Types on Perceived Comfort and Safety of Bicyclists and Potential Bicyclists." Transportation Research Record: Journal of the Transportation Research Board 2520(1): 132-142. https://doi.org/10.3141%2F2520-15

[8] Note that Paris has committed to ban most private vehicles used for through traffic in much of the historic section (5.4 square miles); this is expected to take about 50% of cars off the road.

[9] Jersey City has added a network of secure bike lockers doubling as transit shelters.

neighborhoods with denser residential or commercial uses, the City should expand existing bike share infrastructure.

- Since e-bikes are especially likely to replace car trips, the City should invest in e-bike infrastructure via the BlueBikes network to expand the reach of the system to neighborhoods further from commercial centers in order to reduce more car trips through mode replacement.

Provide positive incentives for bicycling and use of electric bicycles. The City should conduct a study of the cost and feasibility of cash rebates to encourage residents of Cambridge, and especially low-income residents, to purchase bikes, e-bikes, and bike share memberships.

◊ Establish concrete monetary incentives for purchase of e-bikes by Cambridge residents, with additional incentives for low-income residents.[10] Build on pilot programs by the City of Boston and others to incentivize purchases of e-bikes that will replace cars. Design this program under the clear best practices recommendations from the Transportation Research and Education Center (TREC).[11]

◊ Establish e-bike purchase incentives for local businesses that currently use delivery services to reach customers; build recharging and repair stations for e-bike couriers (for an example, see NYC's Los Deliveristas Unidos HUB).

Expand bus priority infrastructure to make public transit more efficient and competitive with private vehicles.

◊ Work with the MBTA to expand past bus lane efforts and identify additional corridors by prioritizing bus passenger travel time improvements.

◊ Commit funding to additional painted bus-only lanes on routes with high bus route usage, and seek out funding in partnership with the MBTA, other state actors, and private foundations for protected center-running bus lane infrastructure and boarding platforms where appropriate due to passenger demand and physical space limits.

End parking minimums and institute parking maximums.

◊ Evidence shows that parking minimums in residential housing development encourage additional car ownership and car usage, which increases overall carbon emissions and traffic. The evidence also indicates that eliminating parking minimums can reduce the cost of housing development, increase housing affordability, and discourage

[10] Many U.S. cities are providing such incentives, in addition, the Equitable Commute Project has created a micromobility subsidy program.
[11] See the TREC report here for detailed information.

single-occupancy car use.

- ◊ We recommend that the City amend its zoning code to eliminate all parking minimums and institute parking maximums in all residential zones and especially in areas within a half-mile of transit stations with rail or high-frequency bus service.

Invest in fare-free transit.

- ◊ Though fares are not the biggest barrier to greater public transit usage and therefore decreased vehicle emissions, eliminating fares can ensure that those people adapting to higher costs of driving alone (as suggested by this document) have lower barriers in shifting to public transportation.
- ◊ The city should implement pilot programs covering the costs of fare revenue on high-usage bus routes, and work with the MBTA and neighboring cities to expand the number of fare-free public transit routes that travel in and through Cambridge.

Transition to an all-electric municipal fleet with an aggressive timeline.

- ◊ Strengthen and codify the current Green Fleet Policy in ordinance.
- ◊ As soon as an EV is available, all new purchases should be EV - with an expected complete replacement for passenger vehicles and light commercial vehicles by 2030;[12] the city's medium and heavy duty fleet should transition by 2035 or sooner.[13]
- ◊ Ensure that all leased and owned school buses are electric vehicles are EVs.

Expand electric car charging infrastructure to encourage electrification of private automobiles in Cambridge.

- ◊ Create an aggressive plan for the expansion of EV charging infrastructure in both commercial districts and residential neighborhoods.
  - Use plans from other cities with EV goals, such as Boston, as a template in the breadth of expansion of these resources.
- ◊ Utilize all existing options - light pole charging,[14] public lot chargers, right to charge, to allow private residences to lease their chargers to the public.
- ◊ 100 more publicly available EV chargers should be installed in the next 5 years and goal established for next 5 years
  - Create a comprehensive plan with community input to identify demand for and placement of these chargers.

[12] NYC, with the largest municipal fleet in the country, has set this goal.
[13] Charlotte, NC plans to convert its 4200 vehicle fleet to electric by 2030; L.A. has committed to electrify its 10,000 vehicle fleet by 2035. Note that certain use cases, such as electric refuse trucks, make sense now - Ocala FL and Miami-Dade County have both added Mack electric refuse trucks to their fleets.
[13] Kansas City has started a streetlight-mounted EV charger pilot focused on equity and accessibility.

- Develop an equity evaluation plan[15] to ensure electric charging infrastructure is expanded to reach all Cambridge residents, and not only those with current electric vehicles.

◊ Seek funding from federal (e.g. ARPA, DOE) and state (e.g. MA's Public Access Electric Vehicle Supply Equipment, or EVSE) sources to enable these incentives.

Explore electric car sharing, which can reduce emissions by up to 43%.

◊ Work with existing regional non-profit models for electric vehicle sharing programs, such as Boston's Good2Go, that encourage use of electric vehicles without ownership.

Increase parking registration fees in order to fund sustainable low-emissions transportation options for Cambridge residents.

◊ Increase resident parking registration fees to more appropriately price the cost of public street space dedicated to cars relative to the status quo. Use established accounting principles to explicitly model the cost of public road space relative to other potential uses.

◊ Further increase resident parking registration fees for those cars beyond the first car owned by each household.

◊ Establish a low-income parking registration fee program that either scales the cost of parking registration to the vehicle value or a flat reduction in fees to current levels for any low-income Cambridge resident.

◊ Use the increased funding from parking registration fees to directly fund tools that encourage alternative forms of transportation identified in this report, such as fare-free transit and e-bike incentive programs.

Develop a comprehensive communications and outreach plan for above recommendations to ensure community buy-in and limit policy backlash.

◊ With the ambitious goals identified in this section to reduce transportation emissions by encouraging mode shift away from single-occupancy car usage, it is inevitable that there will be political resistance.

[15] Useful mobility equity resource: Greenlining Clean Mobility Equity Report.

[16] Additional resources: St. Paul's EV Carshare Program; partnership between St. Paul, Minneapolis, HOURCAR, and dealer partners for bringing EV option to the carshare (now one of the largest operating in the country), alongside the [EV Spot Network(that provides charging for carshare vehicles and public EV owners alike. Specific to equity and environmental justice, there are varying subscription rates for lower income earners, and a [further expansion of EV carshare option to existing multi-unit dwelling carshare operation](https://hourcar.org/multifamily/) (partnership between Xcel Energy, ALA Minnesota, HOURCAR, and East Metro Strong) is currently underworks. Operational area for the Evie Carshare was also designed to incorporate various neighborhoods across the Twin Cities, rather than only focus on high-traffic/downtown areas. A lot of partners brought together, both through federal-funded programming and the Bloomberg American Cities Climate Challenge.

- ◊ The City should establish a comprehensive communications plan that uses all available resources to conduct early and thorough community engagement with the clear goal to best implement the policy goals in this document in a way that helps Cambridge residents and businesses to transition away from fossil fuel dependency.

5. GeoGrids: Cambridge should actively pursue and install a demonstration:

The transition to electrification is an urgent need to meet climate goals. Currently the only way to decarbonize is to electrify and have renewable electricity. With buildings the largest contributor to GHG emissions, heating and cooling buildings have been a focus of efforts. The Cambridge-based Home Energy Efficiency Team (HEET), led by co-executive directors Audrey Schulman and Zeyneb Magavi, has provided a potential way to accomplish this goal. HEET proved its capability by mapping thousands of dangerous gas leaks across the state, highlighting that the need to move away from natural gas as quickly as possible is both a matter of climate emergency as well as public safety.

Networked ground source heat pumps represent a viable path towards transitioning away from natural gas. HEET's GeoGrid[17] : a system of networked ground source heat pumps, structured like a gas system to provide heat to an entire district, was reviewed by the CCWG. The infrastructure is installed in the street, with pipes going into every building. The only emissions come from electricity used, so any building connected would immediately reduce emissions and as the grid was greener, get to net zero or zero emissions. This type of system could meet 100% of energy needs - in some cases, even resulting in excess energy the initial results of installations show where it has been installed the system is cleaner, cheaper in the long-term, and healthier for residents.

The impact of implementing wide scale GeoGridsis potentially monumental. The CCWG asked Councillor Nolan and the Mayor to push for Cambridge as a pilot site for Eversource to install a GeoGrid, and a policy order resulted.

RECOMMENDATION: Since Cambridge was not selected for the first Eversource demonstration installation, the city should find a way to do a pilot installation, either using city funds for one or more sites in Cambridge or having a third party company install, own, and maintain the system. A pilot site should be chosen to maximize impact and equity - the densest parts of the city deserve the potential financial savings and health benefits of eliminating gas with its attendant adverse health effects. The idea is to work with Eversource and HEET to structure a pilot.

[17] https://heet.org/geomicrodistrict-introduction/

6. Use all means possible to limit new fossil fuel infrastructure:
The CCWG has endorsed an idea to amend the special permit process in Cambridge, making it more difficult for new construction to use fossil fuel infrastructure. Since the CCWG concluded this work, the Attorney General has opined that this approach was not in line with the state building code. The question is whether there is any path for Cambridge to incentivize developers and builders to have no new fossil fuel in their buildings through the special permit process. This proposal from Brookline activists, who had tried to institute a ban on all new gas or fossil fuel connections in 2019, appeared feasible until very recently when the AG ruling was issued. Despite a well reasoned, clear legal rationale that it could work, in light of the AG ruling, Cambridge would need to file a home rule which may or may not be approved.
Attention on this question of requiring no new fossil fuel infrastructure is now directed to the stretch energy code update in draft [straw] proposal form.

The current climate actions as written into ordinance and the Net Zero Action Plan are not sufficient to reach our emissions reduction goals, and new buildings are in planning now, making new and more aggressive plans crucial in the climate emergency. The state has released the net zero stretch energy code draft, and it will not do enough. The City Council and the City have advocated for a better code and should encourage all stakeholders to follow suit.

RECOMMENDATION: Pursue the Special Permit route to ending new fossil fuel infrastructure in large buildings, and work with the legal department on whether there is a way to craft an incentive system that could pass legal review. And advocate at every level for a strong, true net-zero stretch code that would allow municipalities to mandate all new buildings and major renovations decarbonize.

7. Other Action Items: implement when feasible ***https://docs.google.com/spreadsheets/d/17GKGKDfGGd6C9frPKdQKqS4bHcBseCxsktxWl6EKMJ8/edit#gid=534731909:***

- Major Outreach Campaign on MassSave programs - for all residents including renters and low income homeowners; use MSYEP and all means to have more people participate
- Identify City-owned land that could be used for a "Green the Small Spaces" program, where small plots of land (i.e., too small for building affordable housing units) could be turned into community gardens or small parks (e.g., more Miyawaki Forests).
- Ban gas-powered leaf blowers and lawn mowers and other small two cycle engines, since there are long term public health costs to workers and quality of life benefits, mostly vulnerable communities
- Adopt a food purchasing program in line with public health and environmental concerns [Sample policy exists in other cities]
- Enforce existing idling laws and increase anti-idling efforts: campaign for all drivers to stop idling the engines on their vehicles while making a pick-up or delivery.
- Consider purchasing e-bikes including e-cargo bikes for use by city employees
- Create incentives for landlords to put solar panels on building roofs and improve energy efficiency of their buildings
- Expand compost program to large buildings and require all residents and businesses to compost

Appendix A:

CCWG presentations highlights.

View all past meeting slides at https://www.cambridgema.gov/Departments/mayorsoffice/climatecrisisworkinggroup

Agenda

September 1, 6-8 pm

- Welcome and introduction (20 minutes)
- Overview: setting the stage for the CCWG (20 minutes)
  - why is this work happening now?
  - What work has been done already?
  - What is our goal and how will we meet it?
- Discussion (60 minutes)
- Next steps (10 minutes)

Introductions!

- Mayor Siddiqui
- Councillor Nolan
- Audrey Shulman
- Ben Hellerstein
- Carol Lee Rawn
- Connor Rockett
- Cynthia Hibbard
- Daniel Mascoop
- Dr. Gaurab Basu
- Justin de Benedictis-Kessner
- Lyn Huckabee
- Malcolm Bliss
- Margery Davies
- Michael Scarlett
- Susanne Rasmussen & Seth Federspiel

Facilitator - for today Patty & Michael

Please include your name, pronouns, the focus of your climate work and your motivation for being here

What are we going to accomplish?

The purpose of the Mayor's Climate Working Group is to bring together climate leaders to determine what immediate actions the City &/or The City Council can take for Cambridge to reduce emissions and be a climate leader. The city has been working hard and failed to meet goals - we need to work smarter.

Yes it's an emergency

1. The climate crisis is here, and worsening with each day, week, month, and year
2. Cambridge climate goals are too weak, AND we're not meeting them
3. Mass. Climate Roadmap Bill demands faster progress
4. Other municipalities are surpassing us

Bishop Allen Drive

Massachusetts' 2030 statewide emissions goal

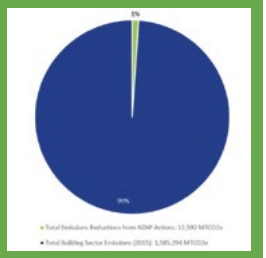
The climate roadmap Clean Energy and Climate Plan for 2030 includes a statewide greenhouse gas (GHG) emissions limit of 50% below the 1990 GHG emissions level for the year 2030.

Cambridge emissions:

- 1.16 million tons CO_2 in 1990
- 1.46 million metric tons in 2012 and no lower in 2019
- ⇒ to do what the state law mandates, our GHG emissions must equal .58 million tons by 2030 which is **a 60% reduction from today**.
- Shouldn't Cambridge EXCEED the state law and be a climate leader?
  - Should Net zero by 2040 be the goal?

Results from NZAP Impact Evaluation Report

"…over the next 10 years, emissions need to be reduced 240,000 – 290,000 MTCO2e just to align with the 2°C Paris Agreement limit—***an almost 20x increase over the initial five-year period.*** The city needs to remain aggressive in its approach and find additional ways to cut greenhouse gas emissions. ***The next five-year period will be critical.*** If the current trend continues and emissions remain flat, meeting the targets set by the Paris Agreement for 2030 will become much more difficult, and significant adjustments in strategy will be needed to achieve carbon neutrality by 2050."



"The next five-year period will be critical."

- NZAP 5 year review conclusion

And it's really 4 years from now - the report is December 2020

How are we going to achieve our goals?

- First, we set and state Goals
- Second, we change the culture to one of intensive focus on results, honesty about outcomes and holding ourselves accountable

From city's Sustainability dashboard early 2020:
Goals for installed solar .....and community GHG emissions

How to achieve goals: start with transparency.

- Cambridge used to have some specific public climate goals - yet when it was pointed out we failed to meet some goals, they were erased from the website. Literally - see below. If we are going to meet our goals in the future, we will only be able to do so by changing our approach:
  - Publicly set goals, measure progress, adjust if necessary

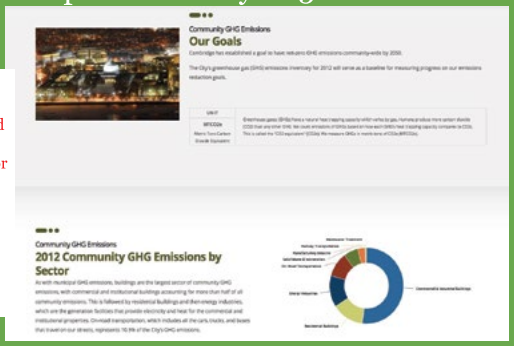
From city's Sustainability dashboard late 2020

Goals were disappeared

NO Goals except net-zero by 2050 - a state mandate

No specific goals, no specific measures, old data. Less information than prior dashboard.

"If you don't know where you're going, any road gets you there."

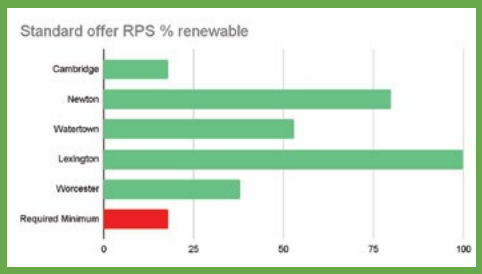


Change needed: Set specific goals e.g. solar citywide

When goals are not met, ask why. Learn. Acknowledge. Adjust. Don't change the goalposts. Change in culture is necessary.

Past goals

Change: Climate work should be vetted by community and Council : Aggregation plan a missed opportunity



Cambridge standard EQUALS the state while other cities far surpass in RPS

Even if RECs are not guaranteed to produce solar, the Cambridge adder is minimal (2.5% equivalent of renewable). And the more RECs the more pressure to build renewables.

Example of success: City solar & Waste

When the goals are clear, plan is implemented, result can be achieved. The city stormwater management, solar capacity and waste reduction have been successful to date.

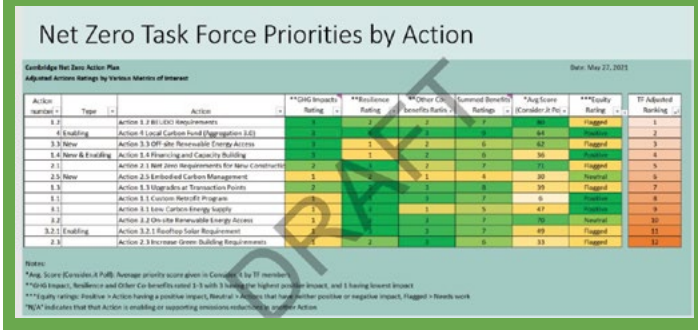
Now we need all players to step up and meet the goals.

Climate work to date: Overview

- City has done incredible amount of work - planning, reports, studies
- Starting to have more action oriented plans:
  - NZAP - not only the 5 year review - there is an extensive list of actions to take in the Draft plan
  - CPAC recommendations
  - CRZTF report
  - Zero Waste plan for the city
  - EV policy and plan

The CCWG will BUILD on this work, accelerate timelines and add any relevant actionable items that will move the needle.

Climate work to date: NZAP sample chart



Draft workplan for meetings: Framing A

- Broadly speaking, these are ideas for agendas of the CWG meetings:
  - Meeting #1 (today): Introductions, plan of action, discuss reports
  - Meeting #2: Idea review and generation: goal: end up with list of possible actions to take
  - Meeting #3: Energy efficiency actions: review, prioritize
  - Meeting #4: GHG emissions reduction actions: review, prioritize
  - Meeting #5: Transition actions: review, prioritize
  - Meeting #6: Summarize findings, finalize report

Draft workplan for meetings: Framing B

- Broadly speaking, these are ideas for agendas of the CWG meetings:
  - Meeting #1 (today): Introductions, plan of action, discuss reports
  - Meeting #2: Idea review and generation: goal: end up with list of actions to take, focus on small ideas
  - Meeting #3: Large impact ideas, focus on building sector
  - Meeting #4: Large impact ideas outside of buildings
  - Meeting #5: Consolidate report and recommendations
  - Meeting #6: Summarize findings, finalize report

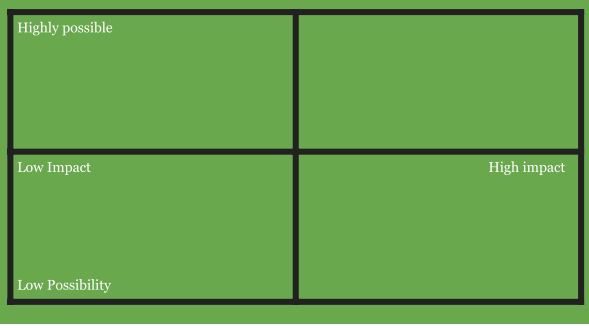
Why will/how can the CCWG have impact?

- Covid response showed what an emergency response entails
  - Funding, programs, policies, actions all transformed in a few months
- State passed Climate Roadmap => to be a true climate leader and regain our position, Cambridge MUST do more
- In NZAP next steps the city has included for the first time ever a clearer call for prioritization, based on assessment of impact on GHG emissions and equity lens
- The world is literally on fire and/or drowning and the costs of the climate crisis are impossible to deny or ignore.

Getting Stuff Done in Cambridge

- Cambridge has a strong city manager form of government - the City Manager (hired by the City Council), is the CEO of the city and has equivalent power to Mayors in other cities
- The City Council main power related to climate: Passes ordinances (laws)
- Community pressure affects both the CM and CC
  - Example: CCWG, residents, groups

Plan to categorize ideas:



Discussion:

- Feedback on framing for next meetings: by theme [Energy Efficiency, GHG Emissions, Transition] or not?
- Resources for the CCWG to tap into - we've put out the word to city's groups [CPAC, CRZTF, NZAP] and to some community groups [Green Cambridge, 350MA]
- How best can we leverage YOUR area of expertise and include in our work?

Next steps/wrap up:

- Next meeting Sept. 15 5-6:30 pm*
- Homework
- Set dates for future meetings
- THANK YOU!!!!

** Yom Kippor starts at sundown at 7 pm so we will end before then*

Agenda

Wednesday, October 13th

- Meeting 2 Summary (5 minutes)
- Review agenda and next meetings (5-10 minutes)
- Review of current City plans and actions (10 minutes)
- Ideas for action steps - successes and failure (10-15 minutes)
- Preliminary identification of barriers (10 minutes)
- Discuss example of climate successes and failures (60 minutes)
  - Why did the initiative succeed/fail?
  - Are the barriers the right ones, and can steps to overcome them be identified?
- What are we missing that's important? (5-10 minutes)
- Snapshot of next meeting's goals and homework

2

Meeting 2 Summary

Discussed/identified Key Actors

- **City of Cambridge: City Manager & Staff and City Council**
- **Higher Education: Harvard, MIT, Lesley**
- **Developers, architects, other construction industry players [Unions, firms]**
- **Property owners: Large commercial, Large residential, Small residential**
- **Residents - renters and owners**

Discussed how to best identify actions to take

- **Work on understanding barriers so progress can be made**
- **Will build on existing work**
- **Will add to existing lists if implementable meaningful action**

3

Meeting Goal: Review Refine Work Plan

- **Today: agenda next page**
  - **Meeting #4 :** Deeper dive/discussion on how to make progress on a limited number of issues to tackle. [BEUDO, Electrification, so far.]
  - **Meeting 5:** Finish discussion of a few big actions AND specify quick actions/low-hanging fruit. [brainstorm ideas from no gas leaf blowers to all EV city cars to no street cleaning warning truck]
  - **Meeting #6:** Review/refine action plan - by actor with clear next steps

Comments, concerns, or thoughts?

4

Current City Actions - Buildings

Custom Retrofit Program in Residential Buildings

*Scheduled Full Implementation *: Early 2020 [Pilot 2017-19]*
Status: Implemented ? not clear on goals or impact.

BEUDO Performance Requirements

Scheduled Implementation: Early 2019*
Status: Delayed, in process no draft for review yet

Upgrades at Transaction Points

Scheduled Implementation: Early 2020*
Status: Delayed

Net Zero Requirements for New Construction

Scheduled Implementation: N/A*
Status: Feasibility stage - delayed several years

Updated Green Building Requirements

Scheduled Implementation: 2017*
Status: Delayed (partially implemented)

Net Zero Requirements for Municipal Buildings

Scheduled Implementation: Early 2021*
Status: Implemented

Scheduled implementation date determined through original NZAP target table - April 29, 2015

5

Current City Actions - Energy Supply

Carbon-free Thermal Energy
Support transition to low-carbon thermal energy. Support individual de-carbonization and study how to transition away from fossil fuel infrastructure.
Scheduled Implementation: n/a*
Status: Feasibility stage - not clear what is happening

On-site and Off-site Renewable Electricity Access
On-site: Offer no-cost option for building owners to participate in development of solar projects.
Off-site: Procure off-site renewable energy projects based on certain criteria.
Scheduled Implementation: n/a*
Status: Feasibility stage

Rooftop Solar Ready Requirements
Pursuing a requirement for on-site renewable energy for new buildings, focusing on solar. New deadline: by 2022, all roofs on new construction should include solar PV and/or thermal.
Scheduled Implementation: 2017-2020*
Status: Delayed
Green Roofs required now

Scheduled implementation date determined through original NZAP target table - April 29, 2015

6

Current City Actions - Selected Other

Local Carbon Fund
Community Choice Aggregation 3.0. Allows for widespread energy efficiency and electrification improvements. Provides funding and access to help implement clean energy projects. Pilot study complete.
Scheduled Implementation: 2019*
Status: Not clear

Net Zero Labs Standards
Create energy efficiency standards for labs. Work with stakeholders (research institutions, industrial hygienists) to create new energy use standards. Currently in design stage.
Scheduled Implementation: Pilot in 2020-21,*
Status: Delayed - not clear if pilot happened?

Communication Strategy
Implementation of communication strategy ongoing. Next steps are stakeholder engagement activities.
Scheduled Implementation: 2018*
Status: Implemented but no measure of effectiveness

Scheduled implementation date determined through original NZAP target table - April 29, 2015

7

Most actions city has taken part of NZAP.

In 2015, the NZAP was implemented
Strength: set timelines
Weakness: no specific or measurable goals

RESULT: *To date, almost no deadline was met*

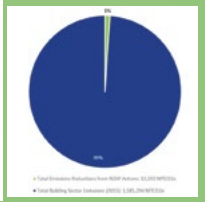
Status: Most steps Delayed from 1-4 years

8

Results of NZAP after 5 years: almost no impact

Table 5-1: Summary of Performance by Action

Action	Parameter	Estimated Emissions Savings (MTCO2e)
Customer Retrofit Program (NZAP Action 1.1.1.)	Electricity and Gas Savings from Participating Projects	0
Article 22 Green Building Requirement (NZAP Action 2.3)	Estimated energy savings beyond code	8,705
Renewal of Municipal Buildings (NZAP Action 2.4.2)	Electricity and Gas Savings from Participating Projects	1,504
Rooftop Solar Ready Requirements (NZAP Action 3.2)	Capacity of Installed Systems & System Production	2,383
Cambridge Community Electricity Aggregation – Green+ Product	Purchase of 100% Renewable Electricity consumption	0
	Total	12,592



2020 NZAP 5 year review:

Strength: External review, summary a call to change course.
Weakness: No sense of why most goals were not met.
RESULT: *No action plan or learning*
Status: Next Plan will be released in next few days

9

Individual Interviews - Top Ideas

Ideas
Advance/fast-track BEUDO requirements
Community aggregation - Opt-out of community aggregation program instead of opt-in
Electrify buildings (cambridge community electricity program, on-site renewables, etc.)
Create third-party that has enforcement authority outside of the City Manager
Mobilize citizen involvement
Work with Eversource infrastructure to move toward thermal/away from gas
Eco-restoration, particularly soil
Outreach to residents regarding current initiatives

Other ideas:

- Set embodied carbon standards
- De-clutter Cambridge website
- Lobby state to develop stretch building code
- Increase tree density
- Prepare advice and information for renters regarding energy efficiency
- Electrify city's vehicle fleet
- Eliminate parking minimums and institute parking maximums
- Tax all buildings for GHG emissions
- De-pave as many places as possible
- Participate in state docket to decarbonize gas (DPU2080)
- Create tax reduction incentive program for businesses that provide public transportation benefits
- Fast-track bus/bike lanes, incentivise people to get rid of cars

10

Successes and Failures

Areas of success: goals met

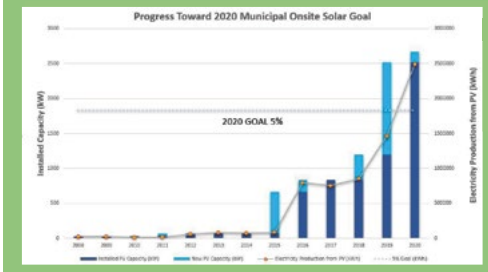
- **City's onsite renewable energy**
- **Waste reduction**
- **Municipal reduction in emissions**

Areas of challenge: most climate programs have not met expectations, almost all are delayed 1-3 years and many never had explicit goals

- **Local carbon fund**
- **Electrical aggregation program**
- **Installation of solar across the city**
- **EV penetration, installation of EV chargers on light poles**
- **Fully electrified buildings - commercial, labs, large residential, homes**
- **BEUDO amendments - still in formation**
- **....**

11

Success - City On-site Renewables



- 2015 goal: City will generate 5% of electricity it uses through on-site renewable systems by 2020
- 2019: 5% target reached

Cambridge reduced municipal energy use by 11.3% between 2008 - 2020

Cambridge has installed 2,520 kW in solar energy capacity at city facilities to date.

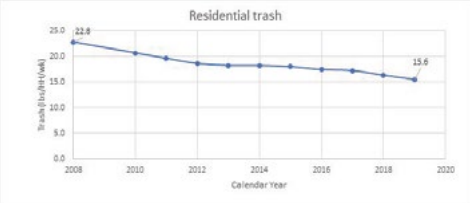
12

Successes - Waste Program

- 2009 goal: Reduce trash by 30% by 2020 and 80% by 2050
- 2019: Trash reduction goal achieved one year early
  - Trash reduced by 32% - 15.6 lbs per household

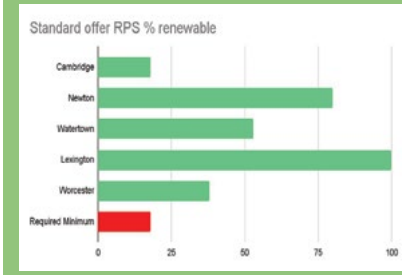
How did this succeed?

- Improved curbside recycling
- Expansion of curbside composting program
- Educational campaigns to shift behavior - encouraging reduction and reuse of materials before disposal



13

CCE & Renewables: Not Meeting Expectations



- Cambridge behind other cities
- Less than 5% of accounts sign up for 100% renewable opt-up option
- Adder yields $600K/year, equivalent to only 2.5%/year renewable → still lower RPS
- MIT invested in Power Purchase Agreement in 2016, built by 2017. Plant offsets 17% of emissions

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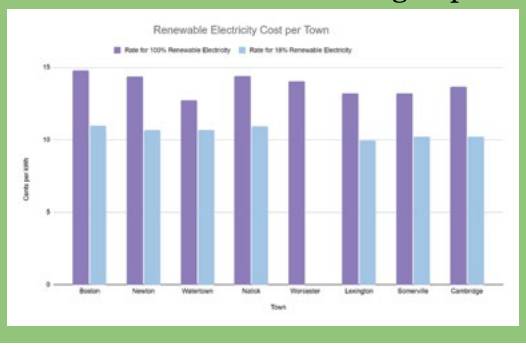
CCE & Renewables: Not Meeting Expectations



15

Zero Emissions Buildings (Including BEUDO)

- City overall needs to reduce emissions by 60% in next 9 years -by 2030 per state goal. Cannot get there with new buildings alone, cannot get there without dramatically changed actions
- Cambridge missed goal for BEUDO performance standards
- Cambridge now behind Boston: in implementation, applicability, [above 50 units v 35], and shorter timelines
- Don't know how many buildings are net zero capable, meaning all electrified

Questions to inform discussion:
What happened with Cambridge Compact for sustainable future?
Has modeling been done of timeline in Cambridge plans - to see if emissions reduction goals are met?

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Barriers

MINDSET

- Climate-forward programs are not updated often enough
- Fear of opposition from wealthy stakeholders (homeowners, developers, etc.)
- Lack of political leadership and understanding of malleability of climate policy
- Climate isn't prioritized by City Manager
- Difference in understanding as to actions and their impact

MANDATE

- Unwillingness to enforce mandates
- Structure of Cambridge government doesn't mean council recommendations are implemented
- Mandates are necessary in an emergency
- All ideas have to pass through multiple layers - legal, CM, etc.
- High level barrier - state laws can override local (like building code)

MONEY

- Not enough money allocated for climate programs
- Equity concerns
- Funding is available - just needs to be identified and allocated

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Discussion

- What made successes possible?
- Are barriers identified to date the right ones?
- How to overcome barriers?

18

Check in: are we making progress? Anything we've missed?

- What and who have we left out?
- What are we not yet thinking about?

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For Next Time:

- We will share the ideas on actions from interviews
- Plan is to review the top level most impactful ideas - should each CCWG member do a pitch for their idea?
- Create an action plan for highest-rated ideas

Thank You!

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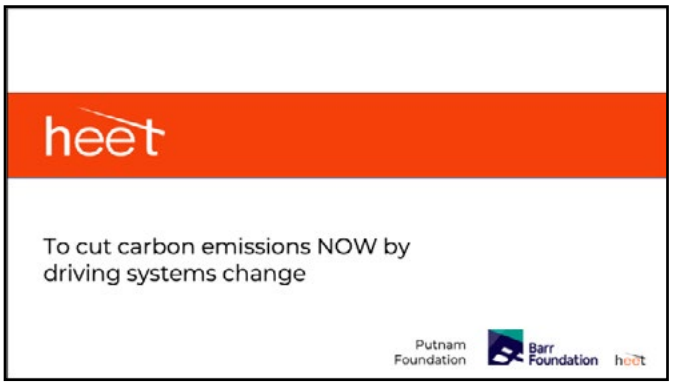
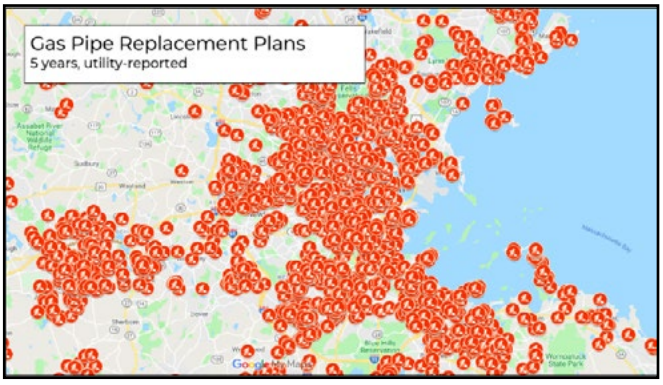
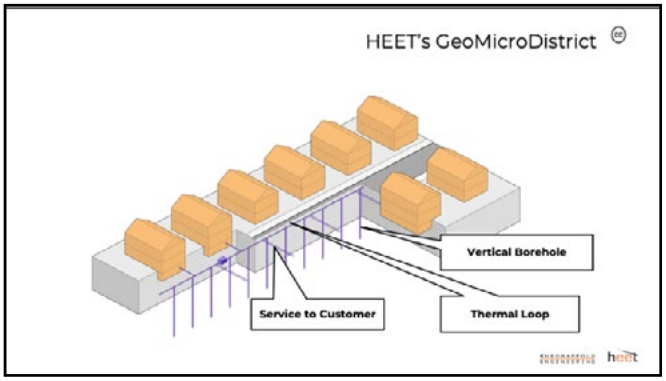
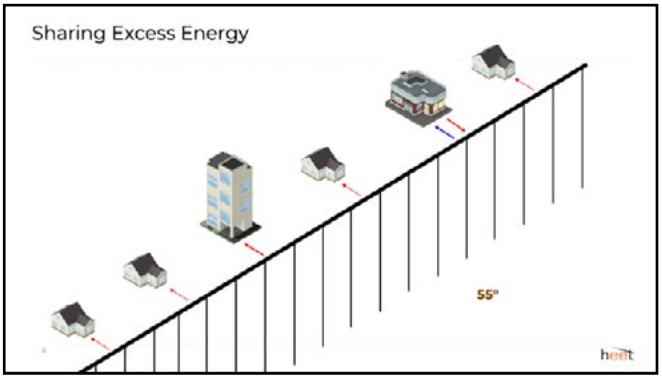
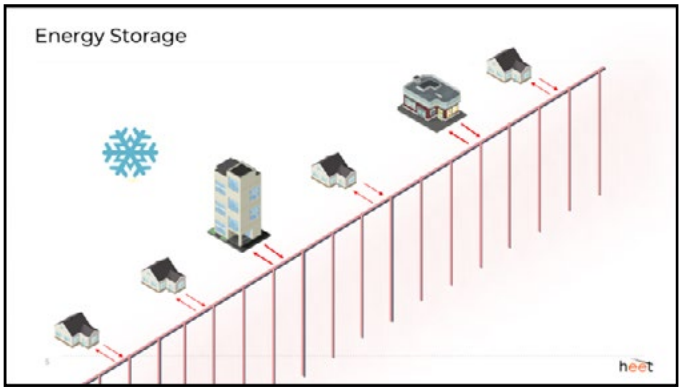
Appendix B:
HEET presentation on district geogrids
https://heet.org/geogrid/

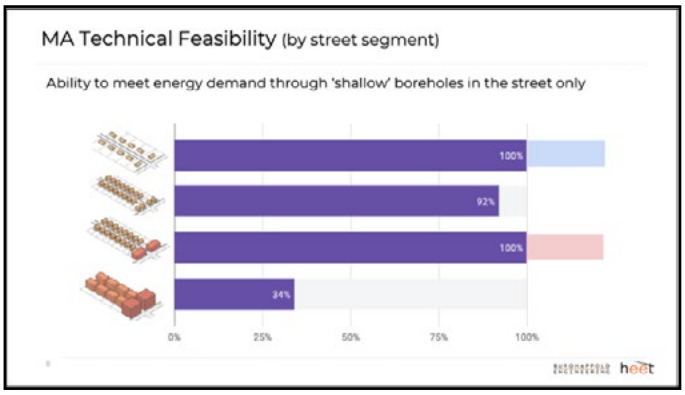


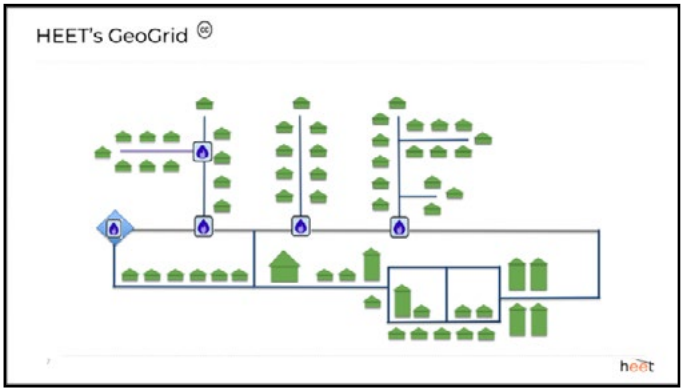


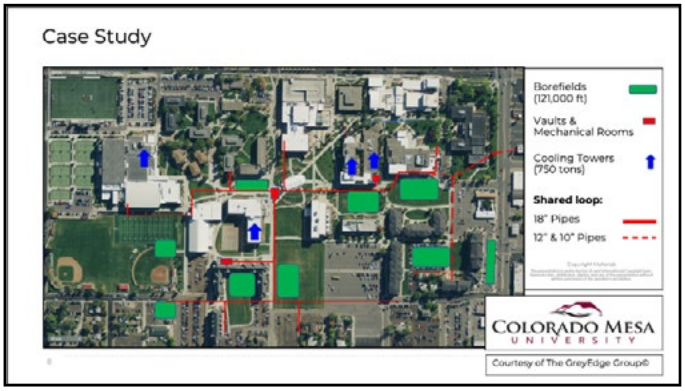





Energy Storage
heet

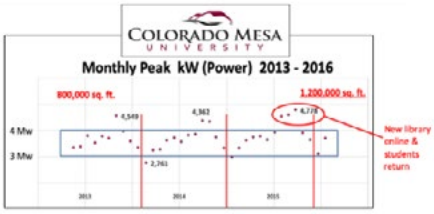

MA Technical Feasibility (by street segment)
Ability to meet energy demand through 'shallow' boreholes in the street only
100%
92%
100%
34%
0%
25%
50%
75%
100%
heet


HEET's GeoGrid
heet


Case Study
Borefields (121,000 ft)
Vaults & Mechanical Rooms
Cooling Towers (750 tons)
Shared loop:
18" Pipes
12" & 10" Pipes
COLORADO MESA UNIVERSITY
Courtesy of The GreyEdge Group©

Benefits

- Safer
- Healthier indoor air
- Provides cooling
- Energy bill savings
- Lower emissions
- Worker retraining
- Flatten electric peaks



heet

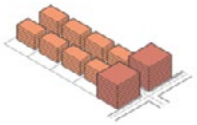
Eversource Approved Pilot

The deal

- Eversource installs, owns & maintains infrastructure in the street
- Eversource pays for heat pumps & efficiency in the buildings

Fixed low energy bills

- Residential : $20/month ($5/month low income)
- Commercial : not yet determined, but very low



High density mixed-use

heet

Eversource Approved Pilot

- Eversource gas (& preferably Eversource electric) territory
  - Hyde Park, Mattapan, Cambridge, Somerville, Worcester…
- Urban environment
- @ 100 homes (with some low income) & businesses
- A mix of new & existing buildings

Timeline

- Site determined by spring
- Geo system installed this summer
- System turned on this fall

If you have a site, email info@HEETma.org

High density mixed-use

heet

Merrimack Valley Approved Pilot

- $4 million from Columbia Gas sale
- Competitive grant, run by ACO & DOER
- Grant to design, install & operate
- North Andover or Lawrence
- Does NOT need to be run by a utility. Open to all.

heet

National Grid Request (DPU 21-24)

- Filed March 2021
- $15.6 million
- 100 to 200 units (businesses & homes)
- Installs, owns & maintains infrastructure in the street

Focuses on:

- Replace leakprone gas infrastructure with geo
- Working with low income & EJ communities
- Reducing investment in areas with gas constraints

19

heet

National Grid Request

Grid

- Pays for heat pumps, appliances & retrofits in buildings

Customers

- Residential - $150/month for 2 years
- Low income - $112/month for 2 years
- Commercial - $225/month for 2 years

Comment letters welcome. DPU 21-24.

If you have a site, email info@HEET.org

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References & Resources

1. "GeoMicroDistrict Feasibility Study", Buro Happold & HEET, 2019
2. Eversource Gas geothermal pilot ratecase DPU 19-120
3. AG Healey's Petition to Consider the Future of Gas
4. Applied Economic Clinic policy brief
5. 'Energy Shift — A Utility-Scale Path From Gas To Renewable Thermal,' Zeyneb Magavi and Audrey Schulman, Building Energy Magazine, Nov. 2019.
6. Schulman, A., 2020. Pipes or Wires. Rocky Mountain Institute blog.
7. AG Healey deal with Columbia Gas & Transfer to Eversource Gas
8. Skarphagen, H. et al, 2019. 'Design Considerations for Borehole Thermal Energy Storage (BTES): A Review with Emphasis on Convective Heat Transfer,' *GeoFluids, Hindawi. https://doi.org/10.1155/2019/4961781.*
9. Bunning, F. et al, 2018. 'Bidirectional low temperature district energy systems with agent-based control: Performance comparison and operation optimization.' *Applied Energy.* https://doi.org/10.1016/j.apenergy.2017.10.072
10. Buffa, S. et al, 2019. '5th generation district heating and cooling systems: A review of existing cases in Europe.' *Renewable and Sustainable Energy Reviews.* https://doi.org/10.1016/j.rser.2018.12.059