

**Climate Resilience Zoning Task Force  
City of Cambridge, Massachusetts  
Meeting #12 Summary  
January 29, 2019  
Citywide Senior Center**

**Task Force members present**

1. Jason Alves, East Cambridge Business Association
2. Louis Bacci Jr., Laborers Local 151 East Cambridge/Planning Board
3. John Bolduc, Environmental Planner
4. Doug Brown, West Cambridge
5. Tom Chase, Energy & Resilience Consultant, New Ecology
6. Ted Cohen, North Cambridge/Planning Board
7. Iram Farooq, Assistant City Manager for Community Development
8. Brian Goldberg, MIT Office of Sustainability
9. Tom Lucey, Harvard University
10. Joe Maguire, Alexandria
11. Lauren Miller, Climate Consultant, CDM Smith
12. Margaret Moran, Cambridge Housing Authority
13. Mike Nakagawa, North Cambridge
14. Jim Newman, Resilience Consultant, Linnaean Solutions
15. Craig Nicholson, Just-A-Start
16. Mike Owu, MITMCo
17. Kathy Watkins, City Engineer/Assistant Commissioner

**Staff and project team present**

1. Jeff Roberts, Director of Zoning and Development, City of Cambridge
2. Sarah Scott, Associate Zoning Planner, City of Cambridge
3. Nathalie Beauvais, Kleinfelder
4. Bella Purdy, Kleinfelder
5. Eric Kramer, Reed Hilderbrand
6. Stephanie Hsia, Reed Hilderbrand
7. Indrani Ghosh, Weston and Sampson
8. Elizabeth Cooper, Consensus Building Institute Facilitator
9. Angel Suero, Consensus Building Institute Junior Associate

**Next Steps**

- Next meeting will take place on February 13th, at City Hall Annex, 344 Broadway, 2nd Floor Conference Room

**Meeting Overview**

The meeting focused on presenting the Cool Factor, a proposed way of formulating a standard for site and building design that would reduce the effect of heat islands in Cambridge, with a

focus on the public realm. The approach is to assign values to different interventions – such as trees, vegetation, green roofs, shading, and high-solar reflectivity materials – and calculate a composite cooling “score” for a site. Task force members asked questions to clarify different aspects of the Cool Factor proposal and offered comments and recommendations to City staff and the technical consultant team. Meeting materials, including the complete Cool Factor presentation are available online:

<https://www.cambridgema.gov/CDD/Projects/Zoning/climateresiliencezoning>.

### Cool Factor Presentation Summary

Task force member comments and questions are summarized in bullet points. *City staff responses and clarifications are noted in italics.*

The Cool Factor is a performance-based system of evaluating measures that contribute to cooling and mitigate heat in urban environments through building and site strategies. The Cool Factor was developed by the City’s consultant team and builds upon work that is being done through the Climate Change Preparedness and Resilience (CCPR) and Urban Forest Master Plan (UFMP) planning efforts.

Development of the Cool Factor was driven by the guiding principles developed by the Task Force, including:

- effectiveness (strategies were selected and weighted for their demonstrated ability to reduce heat);
- differentiation and choice (a performance-based approach acknowledges a diversity of conditions and allows for different ways of achieving the standard);
- people, communities and equity (approach encourages public realm cooling because it provides a greater public benefit);
- flexibility (tool is robust and can be applied in different ways); and
- quality (sets a high standard for open space and site design).

Cooling interventions for site and building design are grouped into four categories: hardscape and structures, planting areas, green roofs, and tree canopy. Interventions are weighted differently based on their overall cooling benefit, and those that benefit the public realm receive additional points through a multiplier. A particular site would earn weighted credits for all of the interventions incorporated into the design, resulting in a combined score. This approach allows property owners the flexibility to choose strategies that best fit their site and design needs.

### SCORING AND OVERVIEW

As proposed, the Cool Factor standard for a site would be in proportion to the required open space ratio in the zoning district, assuming a minimum of 15% in cases where the open space requirement is less than 15%. The reason for this approach is to allow the Cool Factor to be calibrated to the particular development standards of each zoning district, but it could be applied in a more uniform way or calibrated in different ways, such as by parcel size or land use, depending on the Task Force’s recommendation.

The full description of strategies, their demonstrated temperature reduction, and their assigned multiplication factor as well as a draft score sheet are available online:

<https://www.cambridgema.gov/CDD/Projects/Zoning/climateresiliencezoning>.

#### Task Force discussion and feedback:

- How is the public realm defined? How are contributions to public space cooling defined?
  - *The public realm includes sidewalks, roads, and other spaces where the public goes and moves around. This can be illustrated by thinking about a house with a front yard and backyard. If you put a tree on your back yard, it will not count towards public space contribution, but if you put a tree on your front yard close to the sidewalk it will count.*
- There are a number of private streets that are publicly accessible. We should think more broadly about what is benefitting the public.
  - We need to adjust the formulas to provide a 10% bonus (rather than a 110% bonus) for cooling the public way.
- Turf is artificial and a heat absorber, so why is it counted towards the cooling score?
  - *Turf here refers to grass, not artificial turf.*
- In many cases it looks like all the strategies would have to be fully deployed to reach a score of 1. How do we balance the need to encourage people to engage in these strategies without creating impossible barriers to participation?
  - *By using different strategies in different places, parcels have a range of options for achieving a score of 1 or better. This is illustrated in the example test cases.*
- The intensity of planting on a green roof often varies because of the weight of soil. How does the Cool Factor capture this differentiation?
  - *There are green roofs of sedums, and there are intensive green roofs where there is enough landscape to get shrubs and trees, which are rated differently based on their performance. Each roof can have different kinds of planting and calculate different scores for the cooling achieved by different sections, according to the rubric offered.*
  - *All of these factors would be accompanied by definitions and examples to help clarify these different issues.*
- How will enforcement be dealt with for these requirements, considering that living things grow and die, and property owners may make paving and landscaping choices without going back to the City's Inspectional Services Department?
  - *We will talk more about implementation in future meetings. We will need to deliberate over the Cool Factor through a two-step process: first, defining this standard and determining the components for heat resilience for a parcel, and second, figuring out where and how to apply it.*
- How will the competing priorities of installing solar panels and installing green roofs be evaluated?
  - *The goal is to integrate the Cool Factor with other policies.*

- Many historical buildings have pitched roofs, making the installation of green roofs unavailable as a tool to use.

## TESTING

The technical consultant team tested actual and proposed projects on four parcels in different zoning districts. The team then compared the results to assess whether the Cool Factor balanced effectiveness and feasibility and whether the scoring seemed reasonable.

### Task Force discussion and feedback:

- How does Cool Factor deal with “edge” cases and situations with a lot of non-conforming parcels? For example, Harvard Square? Where residential property owners may want to add parking for any reason? What might be the consequences of this regime in those contexts, and how can unintended consequences be avoided?
  - *At this point, we are testing whether this proposed approach could work on various sites in various contexts. Zoning standards set a direction for improvement as changes are made to parcels, but do not generate transformations quickly or completely. Zoning happens very early in a development design process, and it is an opportunity to have an effect on design.*
- When would Cool Factor come into play during residential renovations?
  - *The details of exactly to whom and where this standard would apply need to be determined at a later point in this process. Zoning typically comes into play when changes are being made to parcels, at which point the change has to be more conforming than what was previously there.*
- A large canopy tree may not need 800 cubic feet of soil. Typical street trees in Cambridge have wells that are smaller. Would we be able to account for less?
  - *The cubic footage of roots is measured in depth as well; the 800 cubic feet of soil is not the requirement at the surface level. Some of it may be partially paved over.*
- Compared to other cities, Cambridge’s Urban Forest Master Plan has the lowest final target for canopy coverage over 30 years. If we have a target that is so gradual, then we will be building and unable to accommodate tree canopy. Increasing our target seems like the best way to get trees established.
  - *Cambridge’s tree canopy goal is based on a very in-depth analysis and is actionable. Other tree plans elsewhere may be setting aspirational goals that could be a challenge to meet in the timeframe anticipated.*
- Comparing tree canopy coverage maps to open space maps shows that the areas that don’t have trees are the areas that don’t have open space. If many parcels only multiply by a 15% open space target, how are we going to get the cooling that we need?
- Does the scoring system adequately encourage the preservation of trees? We should adjust the formulas to ensure that preserving existing trees is always given more weight than planting new trees in their place. A new tree that would be planted at 2.5” won’t grow to be a large tree (e.g., 14”) for 20 or more years from planting, but is currently given more weight than maintaining an existing old, large tree with a 14”

diameter. Planting a 14" tree would be a more reasonable replacement for an existing old tree, but that is not reflected in the current scoring system.

- Should there be a requirement that some strategies are implemented at grade? Testing shows that some projects could meet the Cool Factor score mostly through green roofs.
- Could you achieve the Cool Factor score through off-site actions?
- Would projects need to seek height relief to accommodate green roofs?
- Should there be different metrics or standards for new construction versus the rehabilitation of existing buildings?
- What is the threshold that triggers the Cool Factor? What are the actual implications of this approach on cooling in Cambridge?
- Should there be more of a greening element to the Cool Factor? The Cool Factor only looks at the required Open Space of a lot and is only focused on the cooling aspect provided by green infrastructure. A Green Factor could account for the overall "greenness" of the whole lot, and covers other benefits such as cooling (via evapotranspiration) vs. just reducing heating, improved air quality, reduced stormwater run-off, noise reduction, psychological benefits, growth vs. degradation of cooling effects over time, etc. The Cool Factor could be a component of a separate Green Factor.
- We should change the name back to Green Factor to better demonstrate the wider benefits of green infrastructure.
- It's important to require all zoning districts to contribute equally to green infrastructure. The current method of scoring using open space percentage as the denominator rather than lot size makes it appear that projects in industrial districts are greener than those in other districts.

#### Public Comment:

- How will the Cool Factor strategies address existing heat islands in Cambridge? Depending on the way strategies are implemented, they might result in just one degree of cooling. Unfortunately, we don't get climate change one degree at a time, and it is necessary to think of strategies that achieve several things at once. All of the plants and the trees help with stormwater, and also help with cooling, not only through shading but through the soil.
- Zoning or a negative carbon cap could make changes in existing housing stock. A tax break can be created for cool factors at existing apartment buildings or residential buildings. This could also be achieved by offering density incentives.
- Solar in combination with green roofs can often be a good option.
- The SRI of materials deteriorates pretty quickly over years, and it's important to know whether that has been taken into consideration.
- Between green vegetation and reflective paint, should people be encouraged to prioritize green vegetation? Also, shade structures were mentioned. Are there credits for artificial shaded structures in backyards? And for sidewalks, are the solar-reflective pavements creating potential glare issues?

The meeting was adjourned at 8 PM.