Sample Climate Zoning Language for Somerville

As of June 28, 2019

By-Right Ultra-Low Emissions Building Systems

Purpose

In order to foster further adoption of building systems that help to mitigate climate change by reducing greenhouse gas (GHG) emissions through very low-emissions technologies, such as air-source heat pumps, Somerville should allow for these system components by-right. The goal of this language would be to future-proof the code as well as to encourage new technologies and efficiencies that mitigate climate change.

Technologies would include, but are not limited to:

- Community Shared Solar Systems
- Solar Photovoltaic (PV) Panels and Solar Thermal Collectors
- Compressors and Equipment for Air-Source Heat Pumps
- Compressors and Equipment for Ground-Source Heat Pumps

Definitions

Ultra-Low Emissions Building Systems: Ultra-Low Emissions Building Systems are building systems or technologies that do not combust fossil fuels onsite and achieve at least one of the following:

1. Substantially reduce the amount of energy that the building would otherwise use
2. Generate carbon-free energy within the lot
3. Store carbon-free energy for use within the lot

These systems include, but are not limited to: Air-Source Heat Pumps, Ground Source Heat Pumps, Solar PV Systems, Solar Thermal Systems, Solar Hot Water Systems, and Battery Storage.

Carbon Free Energy:

Carbon Free Energy is energy, usually heat or electricity, which is generated from a source that does not use fossil fuels.

Building Energy Reporting and One-Year Audit

Purpose

Require all buildings to 1) report expected energy use and corresponding greenhouse gas (GHG) emissions at the time of permitting, and 2) conduct and submit to the City an energy audit or report from the building management system or similar on the past year's energy use and corresponding GHG emissions one year after the certificate of occupancy, and each year subsequently. This could be implemented in a phased manner to increasingly encompass categories of buildings for which this might be more challenging, such as 1-4 unit residences and historic buildings.

This requirement would build on the City of Boston's Article 37 requirements for energy reporting of large commercial buildings, and will give the City of Somerville additional metrics to track Net Zero targets. This requirement encourages developers to report anticipated building energy use accurately and to deploy behavioral measures and complete retro-commissioning or retrofits when buildings are underperforming. We recommend that the City set a series of declining GHG reduction targets for buildings to meet with their reports each year. These can be based on the declining schedule in the Climate Overlay GHG cap.

Reporting Requirement

New and existing buildings will create a report of their energy use in their benchmark year, which would be the year commissioned for new construction or the year the reporting requirement begins for existing buildings. Buildings will then track their annual energy use (and corresponding greenhouse gas emissions) through Energy Star's Portfolio Manager Tool, or a comparable tool approved by the City. Building developers and then owners will report their building's energy use for all metered uses to the City. The City will publish the results of the reporting for public transparency.

Examples and Best Practices:

City of Boston **Article 37, Green Buildings** http://www.bostonplans.org/planning/planning-initiatives/article-37-green-building-guidelines

City of Cambridge **Building Energy Use Disclosure Ordinance** https://www.cambridgema.gov/CDD/zoninganddevelopment/sustainablebldgs/buildingenergydisclosureordinance

ACEEE **A National Framework for Energy Audit Ordinances** https://aceee.org/files/proceedings/2016/data/papers/9_448.pdf

Massachusetts DOER **Building Energy Asset Labeling Program** whitepaper https://www.mass.gov/service-details/zneb-energy-labeling-for-commercial-buildings and program https://www.mass.gov/service-details/building-rating-labeling-commercial-buildings

South Portland, ME **Energy and Water Benchmarking Ordinance**: https://www.southportland.org/departments/sustainability-office/energy-climate/energy-water-benchmarking-ordinance/

Austin, Texas **Energy Conservation Audit and Disclosure Ordinance** https://austinenergy.com/ae/energy-efficiency/ecad-ordinance/energy-conservation-audit-and-disclosure-ordinance

State of Oregon Building Codes Division **Statewide Alternate Method Oregon Zero Code Efficiency Standard** https://www.oregon.gov/bcd/codes-stand/Documents/sam-18-02-OregonZeroCodeEfficiencyStandard.pdf

Climate Overlay Zone: Set a Per Building Emissions Cap:

The City would be one of the very first municipalities to regulate buildings based on maximum allowable annual GHG emissions, following on the exciting step taken by New York City in April 2019. The emissions cap could be set based on a reduction from the estimated current GHG emissions per building, or building type, or on a sliding scale in order to reach Net Zero no later than 2050. To achieve the increasingly stringent thresholds, buildings could: meet Passive House or comparable standards; generate renewable energy onsite and source the remainder from offsite; and participate in neighborhood-wide efforts such as community shared solar, water-based district energy, and/or car-free blocks.

Examples and Best Practices:

New York City Old Buildings Emissions Standards: https://www.popsci.com/new-york-city-old-buildings-emissions-standards#page-3

Purpose

The objective of a climate overlay zone is to regulate GHG emissions in a designated zone in order to both mitigate climate change and ensure that the co-benefits of mitigation and adaptation are enjoyed by residents of Somerville.

Applicability

This overlay can be most effective near transit centers and around business squares where density would be encouraged. Below are mechanisms that could be made available and encouraged in order to meet the increasingly low-emissions thresholds set for the zone. Individual buildings should have the flexibility to select the mechanisms, from among a list of multiple options in different categories, those owners prefer to meet the thresholds.

Potential GHG Emissions Reduction Overlay Mechanisms:

Buildings:

- Meet Passive House or other ultra low/zero emissions standards
- Deploy accessory dwelling units by-right (allowed by the City) to allow for increased density near transit centers and business squares.
- Install an Eco-roof option.
- Co-locate residential and commercial uses to enable ease of microgrid and/or district energy implementation

Energy Source:

- Enable infrastructure for district heating and cooling systems
- Generate onsite renewable energy and, as necessary, procure offsite generation
- Implement zero fossil-fuel combustion for new construction, likely through electrification and/or district-scale energy generation
- Transition to electric heating/cooling and transit connections to the extent possible
- Encourage residents and businesses to install additional PV capacity for use in, or dedicated systems for the purpose of, community shared solar by-right (allowed by the City).
- Encourage battery and thermal storage and distributed renewable generation (allowed by-right by the City to use onsite and as part of community shared solar systems, microgrids, or similar technologies)

Transportation:

- Build out a car-free zone (established by the City). Establish pedestrian, bike, and bus-focused spaces immediately around transit hubs or residential blocks; parking relocated to perimeters.
- Implement protected bike and pedestrian infrastructure both within and leading to the car-free zones.
- Deploy climate-smart paving. (City to require new paving to be permeable to absorb stormwater, reduce run-off, and utilize albedo in order to reduce urban heat island effect)
- Install Electric Vehicle charging infrastructure. (City to require or incentivize additional density of EV charging stations at the perimeter parking spaces, and enable ZEV car sharing)

Open Space and Landscape:

- Deploy eco-roof requirement including stormwater management
- Develop pocket parks
- Commit to implement or sponsor additional community gardens, shade trees, picnic tables, and other infrastructure within civic zones to encourage public engagement in parks and open space (City to increase Green Area Ratio requirements within the overlay and encourage multi-use civic space).

GHG Emissions Cap

Buildings developed within the Climate Overlay Zone will meet an ultra low/zero emissions standard (such as Passive House) upon construction or during a major renovation. This will address the hardest to remedy aspects of GHG emissions in new construction. In addition to this, new construction within the Climate Overlay Zone should be constructed so as not to exceed a Greenhouse Gas Emissions Cap based on the year constructed.

The Greenhouse Gas Emissions Cap should be based on Somerville's Greenhouse Gas inventory and research as well as the initial results of energy benchmarking. From the results of the benchmarking requirement, the City could analyze the GHG emissions of current new construction, and project an achievable starting point for the GHG Cap, to decline regularly to meet the desired end date (shown as 2050 below).

Maximum allowable Greenhouse Gas (in T CO_2) emitted from the lot based on zone:

Year	Residential (NR, UR) (T CO_2 e)	Mixed Use Districts (MR3, MR4, MR5, MR6) (T CO_2 e)	High Rise District (HR) (T CO_2 e)	Commercial Districts (CC4, CC5, CB) (T CO_2 e)	Industrial (CI, FAB) (T CO_2 e)

2020	X	Y	Z	W	V
2025	.75 X	.75 Y	.75 Z	.75 W	.75 V
2030	.60 X	.60 Y	.60 Z	.60 W	.60 V
2035	.45 X	.45 Y	.45 Z	.45 W	.45 V
2040	.30 X	.30 Y	.30 Z	.30 W	.30 V
2045	.15 X	.15 Y	.15 Z	.15 W	.15 V
2050	0	0	0	0	0

Car-Free Zones

Car-Free Zones would be areas of a few blocks in radius primarily located in areas with residential lots with a high density. Where these are located, the interior of the Car-Free zone would not allow passenger vehicles to travel. Instead, the central area would be converted to civic uses. Uses that support multiple residents would also be supported, such as the conversion of paved roadways to permeable parks and green infrastructure, protected bike lanes and walking paths, and Bus Rapid Transit (BRT) corridors. Parking would be sited at the perimeter of the Car-Free Zone to allow for a transition to the interior Car-Free space. The benefits of the Car-Free Zones are to improve the air quality and other public health benefits for residents within, or using, the zone while also reducing GHG emissions.

Electrification of New Construction

New Construction within the Climate Overlay would be required to utilize ultra-low emissions systems for heating and cooling, through robust building envelopes as well as electrification of building systems or district-scale energy generation and/or storage, whenever possible within the design. Where building systems could not comply, developers would be required to justify why ultra-low emissions systems were not used during the permitting process and receive approval to continue. That development would also be required to adopt alternative measures to further reduce the building's GHG footprint.

Climate Paving

Climate Paving decreases the amount of impermeable surface area allowable and increases the amount of albedo on each lot. Permeable hard surfaces that are lighter in color than asphalt will reflect more light, resulting in a cooler surface temperature, and absorb more water. Permeable alternatives to traditional paving or other hardscape surfaces will be permitted in a greater area than allowed in zones outside of the overlay. The City should also consider encouraging paving alternatives that meet other objectives and achieve other co-benefits, such as allowing solar PV driveways as part of the surface area allowed outside of the Climate Overlay. Climate Paving allowances promote additional green or low-carbon infrastructure and serve to mitigate urban heat islanding effect.

Increased Green Area Ratio Requirements

Within the Climate Overlay, lots should meet a higher minimum green factor than they would otherwise be subject to outside of the district. This green factor minimum would be raised proportionately across all zones within the Climate Overlay.

Potential Use Table for Climate Overlay

Use	NR	UR	MR3	MR4	MR5	MR6	HR	FAB	CC	CI	CB
Accessory Dwelling Units	P	P	P	P	P	P	P	N	N	N	N
Mixed Use Buildings		P	P	P	P	P	P	N	P	N	N
District Heating and Cooling	P	P	P	P	P	P	P	P	P	P	P
Onsite Renewable Energy Generation	P	P	P	P	P	P	P	P	P	P	P
Solar for Community Shared Solar	P	P	P	P	P	P	P	P	P	P	P

Use											
Microgrids and distributed generation	P	P	P	P	P	P	P	P	P	P	P
Energy Storage	P	P	P	P	P	P	P	P	P	P	P
Electric Vehicle Charging Stations	P	P	P	P	P	P	P	P	P	P	P

P - Permitted By-Right SP - Special Permit Required N - Not Permitted

Eco-Roof Requirement:

While acknowledging that not all roofs are appropriate for solar photovoltaic (PV) installation, and that other roof systems may be climate-smart as well, we recommend that the City create an Eco-Roof requirement to ensure that new construction and major renovations maximize roof surfaces to mitigate and adapt to climate change. The language should provide a choice in roof systems while acknowledging that some of these options are more productive for climate mitigation and adaptation and thus preferred over others. We would recommend that the City structure the ordinance to encourage systems that reduce GHG emissions to the greatest extent possible.

New construction and major renovations would be required to include at least one of the following uses as part of their roof system:

Renewable Energy Generation: This could be a solar photovoltaic system or a micro-scale wind generation system.

> Watertown, MA Planning Board Report **Solar Amendments to Zoning Ordinance**: https://www.watertown-ma.gov/DocumentCenter/View/26235/2018-11-27-Zoning---Solar-Assessments. Massachusetts Municipal Association **Watertown Ordinance Requires Solar Panels on Commercial Buildings** https://www.mma.org/watertown-ordinance-requires-solar-panels-on-commercial-buildings/
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> California **2019 Building Energy Efficiency Standards**: https://www.energy.ca.gov/title24/2019standards/ set a PV mandate to go into effect in 2020 **California Solar Permitting Guide Book**: http://opr.ca.gov/docs/20190226-Solar_Permitting_Guidebook_4th_Edition.pdf

Bay Area Air Quality Management District **Solar PV Ordinance**:
https://barc.ca.gov/sites/default/files/instructions_ordinance_pdf.pdf

Solar Thermal System: A system to offset the heating load of the building by pre-heating the building's water with heat generated from solar collectors on the roof.

Austria **Carrots, Sticks and Tambourines: How Upper Austria Became the World's Leading Solar Thermal Market**:
https://www.energiesparverband.at/fileadmin/redakteure/ESV/Info_und_Service/Publikationen/Solar-publ-eu.pdf

Green Roof: A roof system with living vegetation with the purpose of mitigating urban heat, storing water, improving air quality, or conducting urban farming.

Cambridge, MA Zoning Ordinance **22.30 Green Roofs**
https://www.cambridgema.gov/~/media/Files/CDD/ZoningDevel/Ordinance/zo_article22_1397.ashx

Toronto **Green Roof By-Law**: https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/green-roofs/green-roof-bylaw/

Chicago, IL **Zoning Ordinance 17-4-1015 Green Roofs Incentives**:
https://secondcityzoning.org/resources/Chicago-Zoning-Ordinance.pdf (under floor area bonuses)

Georgetown Law **Green Infrastructure Toolkit**:
https://www.georgetownclimate.org/adaptation/toolkits/green-infrastructure-toolkit/incentive-based-tools.html

White (or Cool) Roof: A finishing or surface on the roof that reflects more light than it absorbs, lowering the temperature of the air around it, and thereby helping to reduce urban heat island impacts.

US Department of Energy Building Technologies Program **Guidelines for Selecting Cool Roofs**
https://heatisland.lbl.gov/sites/all/files/coolroofguide_0.pdf

New York City **Cool Roofs Ordinance** https://www.coolrooftoolkit.org/wp-content/uploads/2012/04/NYC-Cool-Roofs-Ordinance-2011.pdf

California Energy Commission **Cool Roof Requirements: California's Title 24 Energy Efficiency Standards for Non Residential Buildings** https://www.energy.ca.gov/title24/coolroofs/documents/COOLROOF-REQUIREMENTS.PDF

Blue Roof: A roof system employed in stormwater management, encompassing active or passive water storage and drainage systems.

Philadelphia, PA Water Department **Storm Water Management Practice Guidance Blue Roofs**
https://www.pwdplanreview.org/manual/chapter-4/4.6-blue-roofs

New York City Planning **Zone Green** https://www1.nyc.gov/assets/planning/download/pdf/plans/zone-green/zone_green.pdf