

## MODEL ORDINANCE FOR ADOPTING COOL ROOF REQUIREMENTS

Note: this model ordinance is an educational resource produced through independent, academic legal and policy research. It is not specific to any jurisdiction. It should be viewed solely as a starting point for legislators, policymakers, and interested stakeholders. It should not be used without being adapted and modified to the particularities of local, county, state, federal or other legal systems, and should be reviewed by an attorney licensed to practice and experienced in the drafting and enactment of legislation in that jurisdiction. The specific reflectivity targets referenced below represent targets that may be customized to the needs of a jurisdiction enacting this model.

The following general terms used in the model have the meanings listed below. Locally applicable terms should be substituted throughout the ordinance.

“AUTHORITY HAVING JURISDICTION” – an organization, political subdivision, office, or individual charged with administering and enforcing the provisions of the building code.

“GOVERNING BODY” – the City Council, Town Board, County Commission, State Assembly, or other comparable entity with authority to enact the model ordinance.

“JURISDICTION” – the city, town, village, county, state, or other political subdivision in which the requirements described in this ordinance would be applicable.

“RELEVANT CODE” – a zoning code, local building code, design standard regulation, or other comparable provision of local law in which roofing requirements are permitted.

“STATE BUILDING CODES” – building codes, energy conservation codes, construction codes, or other comparable regulations that articulate requirements for how buildings are constructed or maintained, and which have been enacted by a state legislature or administrative agency to apply to all political subdivisions within that state. Note that not all states have enacted such codes.

## AN ORDINANCE CONCERNING STANDARDS FOR ROOFING MATERIALS AND RELATED MATTERS

**WHEREAS**, the [GOVERNING BODY] finds that dark, impervious surfaces, including roofing material, characterize the urban environment of [JURISDICTION], absorbing and retaining solar energy that creates an “urban heat island” effect under which parts of [JURISDICTION], especially low-income neighborhoods, are estimated to include far hotter areas than outside the city, and as a result cause heightened energy costs for residents, increased health risk, and more pollution;

[OPTIONAL: *At this point the Ordinance could include a whereas clause describing and citing (if appropriate) specific research on the urban heat island effect within this jurisdiction. For example: WHEREAS*, recent studies estimate that parts of [JURISDICTION] are up to 9°F hotter than surrounding areas;]

**WHEREAS**, extreme heat poses an imminent and significant threat to public health and welfare by increasing emergency room visits, hospitalizations, and even premature death, and extreme heat events are projected to increase in frequency and severity;<sup>1</sup>

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<sup>1</sup> [OPTIONAL: the Ordinance or other materials developed in support of it could include citations to relevant research describing in greater detail the impacts of extreme heat on human health and related issues. A non-exhaustive list of examples of potential research to cite is included in this endnote].

U.S. Environmental Protection Agency, *Climate Change Indicators: Heat Related Deaths*, <https://www.epa.gov/climate-indicators/climate-change-indicators-heat-related-deaths>.

U.S. Environmental Protection Agency, *Mortality Risk Evaluation*, <https://www.epa.gov/environmental-economics/mortality-risk-valuation>.

Michelle L. Bell et al., *Climate Change, Extreme Heat, and Health*, 390 NEW ENGLAND J. MED. (2024), <https://www.nejm.org/doi/full/10.1056/NEJMra2210769>

Antonio De Vita et al, *The Impact of Climate Change and Extreme Weather Conditions on Cardiovascular Health and Acute Cardiovascular Diseases*, 13 J. CLINICAL MED. 759 (2024), <https://www.mdpi.com/2077-0383/13/3/759>.

Tord Kjellstrom et al., *Heat Human Performance, and Occupational Health: A Key Issue for the Assessment of Global Climate Change Impacts*, 37 ANN. REV. OF PUB. HEALTH 97 (2016), <https://www.annualreviews.org/doi/abs/10.1146/annurev-publhealth-032315-021740>.

Luke A. Parsons et al., *Global Labor Loss Due to Humid Heat Exposure Underestimated for Outdoor Workers*, 17 ENV'T RES. LETTERS (2022), <https://iopscience.iop.org/article/10.1088/1748-9326/ac3dae>

Intergovernmental Panel on Climate Change, *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2021), <https://www.ipcc.ch/report/ar6/wg1/>.

Ambarish Vaidyanathan et al., *Heat-Related Emergency Department Visits — United States, May–September 2023*, 73 MORBIDITY AND MORTALITY WEEKLY REPORT 324 (April 18, 2024), [https://www.cdc.gov/mmwr/volumes/73/wr/mm7315a1.htm?utm\\_source=miragenews&utm\\_medium=miragenews&utm\\_campaign=news](https://www.cdc.gov/mmwr/volumes/73/wr/mm7315a1.htm?utm_source=miragenews&utm_medium=miragenews&utm_campaign=news).

**WHEREAS**, roofing materials designed to achieve a high degree of reflectivity mitigate the effects of extreme heat by helping to cool indoor spaces and the city as a whole, and whereas those materials are widely available, cost-effective, and can be installed by appropriately qualified roofers;<sup>2</sup>

[OPTIONAL: *At this point the Ordinance could include a whereas clause expressing the governing body's intention to later increase the reflectivity requirements beyond the levels included below when appropriate products reach the market. Doing so could encourage roofing material manufacturers to continue bringing higher reflectance products to the market. For example: WHEREAS*, the [GOVERNING BODY] expects new products with even higher reflectance ratings to become available as the technologies further develop and the [GOVERNING BODY] intends to update the reflectivity standards applicable throughout this jurisdiction as those new products become widely available;]

[OPTIONAL: *In states that allow local building codes or amendments to statewide building codes, this Ordinance may include provisions making the findings or other legislative actions necessary to, or include statutory language helpful to, justify such a local amendment. For example: WHEREAS*, existing provisions in the [STATE BUILDING CODES] applicable in [JURISDICTION] require only a modest degree of reflectivity and are hereby found by the

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Peter J. Crank et al., *Mental Health and Air Temperature: Attributable Risk Analysis for Schizophrenia Hospital Admissions in Arid Urban Climates*, 862 *SCI. OF THE TOTAL ENV'T* (2023), <https://pubmed.ncbi.nlm.nih.gov/36513225/>.

<sup>2</sup> [OPTIONAL: the Ordinance could include citations to research describing in greater detail the benefits that cool roofs offer for mitigating the effects of extreme heat. A non-exhaustive list of examples of potential research to cite is included in this endnote].

U.S. Department of Energy, *Cool Roofs*, <https://www.energy.gov/energysaver/cool-roofs>.

Office of Energy Efficiency & Renewable Energy, U.S. Department of Energy, *Solar Radiation Basics*, <https://www.energy.gov/eere/solar/solar-radiation-basics>.

U.S. Environmental Protection Agency, *Climate Change Indicators; Heating and Cooling Degree Days*, <https://www.epa.gov/climate-indicators/climate-change-indicators-heating-and-cooling-degree-days>.

Mirata Hosseini & Hashem Akbari, *Effect of Cool Roofs on Commercial Buildings Energy Use in Cold Climates*, 114 *ENERGY AND BUILDINGS* 143 (2016), <https://www.sciencedirect.com/science/article/abs/pii/S0378778815300256>.

P. Ramamurthy et al., *The Joint Influence of Albedo and Insulation on Roof Performance: An Observational Study*, 93 *ENERGY AND BUILDINGS* 249 (2015), <https://www.sciencedirect.com/science/article/abs/pii/S0378778815001450?via%3Dihub>.

Tengfang Xu et al., *Quantifying the Direct Benefits of Cool Roofs in an Urban Setting: Reduced Cooling Energy Use and Lowered Greenhouse Gas Emissions*, 48 *BUILDING AND ENVIRONMENT* 1 (2012), <https://www.sciencedirect.com/science/article/abs/pii/S036013231100254X?via%3Dihub>.

M. Santamouris, *Cooling the Cities – A Review of Reflective and Green Roof Mitigation Technologies to Fight Urban Heat Island and Improve Comfort in Urban Environments*, 103 *SOLAR ENERGY* 682 (2014), <https://www.sciencedirect.com/science/article/abs/pii/S0038092X12002447?via%3Dihub>.

[GOVERNING BODY] to be inadequate to meet its local needs, and whereas further the standards below are not less stringent than the provisions of the [STATE BUILDING CODES];]

**WHEREAS**, in light of the foregoing, the [GOVERNING BODY] finds that reflectivity standards for roofing materials applicable to all new construction and reconstruction in [JURISDICTION] are needed, are justified by the local conditions in [JURISDICTION], and will serve the interests of public health, safety and welfare.

**NOW THEREFORE, THE [GOVERNING BODY] OF [JURISDICTION] HEREBY ORDAINS AS FOLLOWS:**

**SECTION #:** The [RELEVANT CODE CONCERNING RESIDENTIAL BUILDINGS] is hereby amended by adding a new, consecutively-numbered section which shall read as follows:

(a) Unless an exception in subsection (b) applies, roof coverings over conditioned spaces on steep-slope roofs (roof slope > 2:12) shall be constructed of materials that achieve, when tested in accordance with the ANSI/CRRC S100 (CRRC S100) standard:

(i) for metal roofing, a 3-year-aged solar reflectance not less than 0.50;

(ii) for tile roofing, a 3-year-aged solar reflectance not less than 0.40;

(iii) or for roofs of any other material, both a 3-year aged solar reflectance not less than 0.25 and a 3-year aged solar reflectance index not less than 27.

(b) The requirements of this section shall not apply to:

(i) Roof areas covered by living vegetation or equipment reasonably necessary to maintain such vegetation;

(ii) Roof areas designed for and used as outdoor recreation space by the occupants of the building;

(iii) Roof areas containing equipment required by the International Fire Code; or

(iv) Roof areas that comprise 3% or less of a building's roof area.

**SECTION #:** The [RELEVANT CODE CONCERNING COMMERCIAL AND MULTIPLE DWELLING BUILDINGS] is hereby amended by adding a new, consecutively-numbered section which shall read as follows:

(a) Unless an exception in subsection (b) applies, roof coverings over conditioned spaces on low-slope roofs (roof slope  $\leq$  2:12) shall be constructed of materials that achieve, when tested in accordance with the ANSI/CRRC S100 (CRRC S100) standard:

(i) A 3-year aged solar reflectance not less than 0.70; and

(ii) A 3-year aged solar reflectance index not less than 85.

(b) The requirements of this section shall not apply to:

(i) Roof areas covered by living vegetation or equipment reasonably necessary to maintain such vegetation;

(ii) Roof areas designed for and used as outdoor recreation space by the occupants of the building;

(iii) Roof areas containing equipment required by the International Fire Code; or

(iv) Roof areas that comprise 3% or less of a building's roof area.

[OPTIONAL: *Where non-structural roof replacements are exempt from building permit review, an appropriate section of the code could be amended to remove that exemption to ensure compliance with this section. For example: SECTION #: [IN THE EXISTING CODE SECTION DESCRIBING BUILDING PERMIT APPLICABILITY] a new subsection "(a)" shall be added:*

(a) Notwithstanding any other provision of the [RELEVANT CODE], a permit is required for work done to replace more than 25% of the total area of an existing building's roof surface.

[OPTIONAL: *To reduce the burden of requiring permits for roof replacements, an appropriate section of the code could be amended to either give an appropriate official discretion to set low or zero fees, or to actually set that fee at a lower level. For example: SECTION #: [IN THE EXISTING CODE SECTION DESCRIBING BUILDING PERMIT FEES] a new subsection "(a)" shall be added:*

(a) Roof replacement projects that would not require a building permit except by application of [THE CODE SECTION CONTAINING REFLECTIVITY REQUIREMENTS] may, at the discretion of the [AUTHORITY HAVING JURISDICTION], be subject to a lower permitting fee than applies to other projects or may receive expedited permitting review.

[OPTIONAL: *the Ordinance could direct appropriate city staff to expedite and ease the process of obtaining a building permit for a simple roof replacement. For example: SECTION #: Within 90 days of the effective date of this Ordinance the [AUTHORITY HAVING JURISDICTION] shall make available online a building permit application applicable to projects consisting only of a roofing material replacement compliant with this Ordinance. The application shall direct applicants to identify the product to be used and that product's SR and SRI ratings. Projects compliant with the provisions of the Ordinance shall be approved within one week of the [AUTHORITY HAVING JURISDICTION] receiving any such application.]*

**SECTION #:** The provisions of this Ordinance shall become effective as of [EFFECTIVE DATE].

**SECTION #:** To the extent this Ordinance or the provisions of the [RELEVANT CODE] provided for herein conflict with any existing local law, Ordinance, provision of the [RELEVANT CODE] not provided for herein, other code, or other local requirement, the requirements of each shall be harmonized to the extent possible; and where not possible this Ordinance shall prevail.