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DETAILS
Choosing the Right Roof Coating

SAFETY
Preventing Heat-Related Hazards
EACH TURN of the seasons brings a new wave of headlines showing the wide-ranging effects of climate change on everyday people. Melting glaciers, extreme weather events, increased high temperatures, changes in bird migration patterns, and shifting plant habitats all demonstrate that change is underway. However, nature is not the only place where humanity feels its effects. The United Nations recently issued a report showing that global warming is exacerbating already dire conditions of poverty, food insecurity, disease, homelessness, and political unrest.

While climate effects span the globe, many of the most effective efforts to find solutions are happening closer to home in local communities working together to limit energy use and build resilience against rising temperatures and extreme weather events. Many states and municipalities have adopted climate action plans outlining steps toward decarbonization. Relying on information from reputable sources helps leaders set realistic benchmarks and implement best practices to use their limited resources efficiently. One of their most reliable tools is building performance standards (BPS).

Building Performance Standards
Buildings in the United States account for more than 70 percent of electricity usage and 29 percent of natural gas consumption. In fact, buildings are the most significant contributor to greenhouse gas emissions, representing almost 40 percent of total U.S. emissions. Since buildings are part of the problem, they are also a crucial part of the solution.

Building performance standards are a valuable policy tool with tremendous potential to drive change. These policies create realistic benchmarks to help building owners reduce energy waste in existing buildings over set periods of time, prioritizing modifications with the most significant impact, thus lowering carbon emissions and decreasing building energy costs while spreading out the expense of these modifications. The policies address buildings across their life cycle, beyond new construction. The primary intent of a BPS policy is to require underperforming buildings to upgrade components and improve operations. A BPS policy typically includes the following features:

- **Performance targets**: A state or city sets a performance target based on energy use intensity or carbon emissions.
- **Timeline**: Building owners have multiple compliance periods (each period lasting 5 to 6 years) to meet or
it prohibitively expensive to complete them all at once. Strategic planning for roof upgrades allows building owners to leverage a building’s life-cycle events to replace assets like an existing roof with a more thermally efficient roof system as they reach the end of their service lives. This savings-over-time approach is well-suited to the time policy implementation and building retrofit efforts.

**Roof Retrofits and BPS**

Roof alterations play an essential role in helping building owners meet BPS requirements. The list of necessary upgrades to meet the BPS targets may be extensive, and many owners find

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White House BPS Coalition

In January 2022, the White House announced the National Building Performance Standards Coalition — a group of more than 30 state and local governments representing 22 percent of the U.S. population. Members of the coalition have committed to designing and implementing building performance policies and programs in their jurisdictions by Earth Day 2024. Their efforts are supported by federal agencies, labor, and non-governmental organizations dedicated to providing resources for location-based workforce engagement, technical analysis, equity strategies, localized policy design, and stakeholder engagement.

Historically, the federal government and state and local municipalities have relied on voluntary actions to achieve better performance and reduced emissions in existing buildings. It has become clear that the pace of these efforts is too slow in the face of progressive climate change. More timely action is needed to achieve the aggressive energy savings and emissions reductions that are now necessary. The Department of Energy has offered various funding programs for state and local governments to support the needed
horizons of BPS policies. For example, low-slope commercial building roofs commonly require replacement or re-cover beginning 17 to 20 years after initial installation. Planning ahead to include upgraded insulation during either a replacement or re-cover is a cost-effective approach to lowering whole-building energy use.

Roof replacements are a critical BPS compliance strategy for the following reasons:

- **Savings over time:** Building components like roofs replaced during a building’s life cycle offer opportunities to make energy upgrades while maintaining a properly functioning building.
- **Low risk:** Roof alterations are common projects and almost always involve adding insulation above the existing roof deck.
- **Verified savings:** Adding insulation as part of a roof alteration to meet current energy code requirements generates significant whole-building energy savings and greenhouse gas reductions.

**Roof Insulation**

Since the roof comprises the largest single surface of most buildings, roof insulation is a crucial element of building performance. In recognizing the importance of an energy-efficient building thermal envelope, modern energy codes have set minimum requirements for insulation installed entirely above the roof deck for new construction and for existing buildings when the roof is replaced. Below are some examples...
of projected savings by climate zone that may be realized through roofing upgrades:

- Cities located in U.S. Climate Zone 2 are characterized as hot climates, which is defined as an area that has temperatures that exceed 67 degrees for a minimum of 3,000 hours during the warmest six months of the year, and/or exceed 73 degrees for a minimum of 1,500 hours during the warmest six months of the year. Replacing a roof in this climate zone and installing additional roof insulation to meet the prescribed minimum R-value established by building energy standards can yield the carbon equivalent emissions reductions per square foot of approximately 18 to 32 pounds depending on the building type.

- Cities located in U.S. Climate Zone 4 are characterized as mixed climates, which is defined as an area that has approximately 5,400 or fewer heating degree days (at 65 degrees Fahrenheit basis), and where the average monthly outdoor temperature drops below 45 degrees in the winter months. Replacing a roof in this climate zone and installing additional roof insulation to meet the prescribed minimum R-value established by building energy standards can yield the carbon equivalent emissions reductions per square foot of approximately 32 to 81 pounds depending on the building type.

- Cities located in U.S. Climate Zone 5 are characterized as cold climates, which is defined as an area with between 5,400 and 9,000 heating degree days on a 65 degrees Fahrenheit basis. Replacing a roof in this climate zone and installing additional roof insulation to meet the prescribed minimum R-value established by building energy standards can yield carbon equivalent emissions reductions per square foot of approximately 43 to 75 pounds depending on building type.

Climate change impacts may look daunting from a global perspective, but substantial benefits from local solutions like adopting building performance standards are not only an essential component of climate change policy. They also improve comfort for building occupants and decrease the use of precious energy resources.

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