

POLICY OPTION EBEI-8

BUILDING CODE REVISIONS

OPTION DESCRIPTION

Strengthen existing building codes and construction techniques for new infrastructure and structures in vulnerable coastal areas. This will involve evaluating existing codes with respect to their proven effectiveness in past storm events, identifying causes of failure, and implementing changes to codes to improve performance in the future. In addition to past performance, codes should be reviewed and strengthened by taking into account future increased hazards caused by sea level rise and the associated possible increase in storm frequency and intensity caused by climate change. All types of development (residential, commercial, institutional, etc.), as well as public infrastructure such as roads and bridges, should be analyzed. Standards for marine-related structures such as piers and wharves should be included in this review.

In addition to the overall evaluation and strengthening of codes, the entire development process must begin to recognize the potential impacts of sea level rise and climate change. Design professionals must look for ways to ~~mitigate~~ reduce future impacts, and local governments must increase plan review, inspection and enforcement efforts.

This effort is ongoing at several levels. FEMA regularly publishes a “Summary Report on Building Performance” after major natural disasters (such as Hurricane Andrew and Hurricane Katrina). These reports study the damage resulting from the event, identify areas of strength and weakness in building design and construction, and recommend improvements. The International Code Council also studies code effectiveness and regularly makes improvements to its codes. It is imperative that these reviews begin to consider the effects of climate change and sea levels rise on the long-term sustainability of structures and infrastructure.

OPTION DESIGN

- Targets – All construction-related codes should be evaluated for their effectiveness in protecting against the future effects of climate change and sea level rise. This will include the following issues:
 - Elevation of buildings – FEMA and local governments should mandate freeboard for all construction in coastal flood hazard zones. Freeboard is an elevation above a design high water level (base flood elevation). For example, the bottom of the lowest horizontal structural member should be elevated a minimum of two feet (or more) above the base flood elevation. This is especially pertinent with regard to sea level rise, since base flood elevations will be higher in the future. The required freeboard should relate to the amount of sea level rise expected, potential wave height, and the expected life of the structure. Experience from Hurricane Katrina

shows that building elevation is the most effective deterrent to flood damage.

- Foundation design – Certain types of foundations are more effective in flood situations than others. Deep pile or column foundations are desired if significant erosion is possible in oceanfront locations as well as bay locations where the following conditions exist: erodibility of the soil; exposure to “damaging” waves (greater than 1.5 feet high); potential for velocity flow; potential for flood borne debris; and required resistance to wind forces. These locations include FEMA identified V-zones as well as A-zones.
- Long-duration flood impacts – Long-duration flooding, which may be a result of sea level rise in the future, can cause extensive damage to interior contents and building materials. Moisture entrapment within walls and floors can impact structural integrity as well as cause biological and chemical contamination. Elevation will avoid this problem, as will the use of flood resistant building materials above the minimum elevation.
- Debris impact – Substantial damage can be caused by floating or wind-driven debris in a flood or storm event. Current codes and construction standards should be evaluated with regard to debris resistance.
- Building envelope – Building envelope is the entire exterior surface of a building, including walls, windows, doors and roofs. All parts of the building envelope must provide protection from wind, wind pressure, and windborne debris. Building codes are very specific regarding these issues, but they should continually be reviewed and improved as needed.
- Timing – This is primarily an ongoing effort. Codes are currently in place, and should be implemented and enforced by everyone involved in the design and construction process. FEMA and the code agencies continually evaluate the effectiveness of the code requirements, especially after a major event such as a hurricane or flood. These events provide essential information regarding the performance of code complaint structures and reveal areas in need of improvement. Training of enforcement personnel should also be an ongoing effort. **Codes should be reviewed periodically in light of new science and evidence of climate change and sea level rise.**
- Parties involved – All parties involved in the design and construction process should be involved in this effort, including **for example** the International Code Council, design professionals such as architects and engineers, building materials manufacturers, **building trade associations**, the Federal government (FEMA, National Weather Service, NOHH, Corps of Engineers), state government (MEMA, DOE, DNR), and local governments. Property owners also need to be

aware of potential hazards and know how to evaluate the strengths and weaknesses of their properties.

IMPLEMENTATION MECHANISM

Implementation of this option will initially involve an evaluation of existing codes and regulations with specific regard to the threats associated with climate change and sea level rise. ***To account for the expected lifespan of newly constructed buildings***, this will involve looking ~~many years~~ ***decades*** into the future and trying to predict these impacts. If deficiencies are found, changes to codes, regulations and laws will be necessary. Enforcement of these codes is usually the responsibility of local governments; funding assistance is needed to ensure that an adequate number of trained code officials and inspectors are available.

RELATED POLICIES / PROGRAMS IN PLACE

Codes are currently in place to regulate construction. The International Building Code is the primary building code. FEMA's flood insurance program is the primary source of flood protection regulations. State and local governments often compliment these general programs with more site-specific regulations.