

Building Resilience to Tornadoes

City of Moore

📍 Moore, Oklahoma, USA

Hazard(s):

Tornadoes, Wind

Type of action:

Code and standards

Type of actor:

Local government

Description

In less than 15 years, the city of Moore experienced three disastrous tornado events with an intensity of EF-4 or greater on the Enhanced Fujita scale. As a result, in 2014, Moore's city council adopted a series of amendments to its residential building code specifically aimed at mitigating damages caused by tornadoes. The standards were raised to ensure resistance to winds up to 215 km/h (EF-2). At the time it was the most stringent code for wind hazards in the USA. Updated requirements included narrowing spacing of roof joists, the use of oriented strand board to strengthen exterior sheathing, wind rated garage doors, and hurricane straps to secure the roof to the exterior walls.

Code upgrading faced resistance from the Moore Association of Home Builders that raised concern that construction costs would increase drastically. However, studies found that the building code amendments had minimal effect on price per square foot of new home, sale price, or number of residential constructions.¹

Audience

Initiatives linked to code updates and standards crafting are targeted towards:

- **Law and policy makers**, to enable the strengthening of existing codes
- **Community leaders**, to raise awareness
- **Developers and insurers**, to understand the cost effectiveness of higher standards

Timeline

- From 1999 to 2013, the City of Moore experienced three catastrophic tornado events. The 2013 tornado was the third costliest tornado in U.S. history and resulted in 24 fatalities.
- Following the 2013 tornado, the City of Moore became the first city in Oklahoma to update its building code with stringent wind standards.
- In 2014 the City of Moore amended its building code, adopting the most stringent one in the USA.

¹ Simmons, Kevin M. and Kovacs, Paul and Kovacs, Paul, Real Estate Market Response to Enhanced Building Codes in Moore, OK (May 1, 2017). Available at SSRN: <https://ssrn.com/abstract=2963220> or <http://dx.doi.org/10.2139/ssrn.2963220>

How does the initiative address the 10 Principles?

1. Urgency

Being hurt three times by incredibly serious wind events forced the community in Moore to realise the urgency and the need to move from a reactive to a proactive approach. Moore seized the opportunity to build more resiliently, and up to more stringent standards.

2. Stakeholders

To achieve a comprehensive and stringent enough building code, involvement of all stakeholders was necessary: city officials, home builders, members of the public.

3. Process

To draw their building code, the city of Moore worked upon leading national standards which allowed the implementation of actionable levers at every stage of the life cycle with construction and retrofitting solutions.

4. Mitigation

Although tornadoes have not yet been assessed to have a direct link to climate change, the growing variability, seasonality, intensity, and geographic distribution of events are a cause for concern in the United States.

5. Data

Though codes are based off historical hazards maps, and don't incorporate climate modelling, the growing variability, seasonality, intensity, and geographic distribution of strong wind events are a strong component of code updating initiatives.

6. Scale

While the Moore initiative is asset centred, the building code does not only target residential buildings but incorporates all critical infrastructures in the city.

7. Green

The increased standards mostly rely on technological solutions, not nature-based ones.

8. People

Updated standards applied at the construction stage makes a community more resilient for houses and livelihoods are not lost to natural disasters and activities can resume more rapidly. Furthermore, working with codes makes sure insurers rebuild houses to minimum accepted standards, thus making sure the whole community can benefit from more resilient houses and services.

9. Finance

Changes required by the amended code had a minimal impact on the per square foot price of houses and it unequivocally outweighs the cost of inaction. Carefully updating regulations allows homebuilders and homeowners to adapt houses with minimal additional cost.

10. Local

Moore adopted national wind standards and crafted measures fitted to the local context through consultation with local stakeholders.