I. Introduction

In 2005, Hurricane Katrina devastated New Orleans, leaving 1,833 dead and causing $108 billion in property damage. Katrina was the costliest storm in U.S. history, and 2012 brought a close second: Superstorm Sandy caused $65 billion in damage as it tore through 24 states, leaving 160 dead and 6 million without power, and sending a 13-foot storm surge through Battery Park in Lower Manhattan.

While no single weather event can be attributed to climate change, these and other disasters have awakened state and local officials across the country to the urgent need to address the growing threat posed by our changing climate. This article will address the regulatory responses that governments have embraced to tackle climate change, including efforts to mitigate climate change by reducing greenhouse gas emissions, and to adapt to potentially unavoidable consequences of climate change by building our cities to be more resilient to future disasters.

a. Climate Change: The Evidence and the Impacts

According to the most recent report from the Intergovernmental Panel on Climate Change (IPCC), a group of 1,300 independent scientific experts gathered under the auspices of the United Nations, “[w]arming of the climate is unequivocal” and unprecedented changes are already occurring. Climate change is expected to cause a variety of potentially devastating effects worldwide, from more severe storms, to worsening droughts, to deadlier and more frequent heat waves.

The dangers facing the United States vary greatly by region. The Southwest faces worsening droughts and heightened risk of wildfire. The greatest danger to states in the Northeast and Southeast is flooding as a result of sea level rise and increasingly severe storms, as well as more frequent and severe heat waves. These dangers are far from speculative. We are already beginning to experience many of the early effects of climate change, such as torrential rains and flooding in the Northeast, severe drought in the southwest, and unusually high temperature across the country. For example, the number of heat waves nationwide in 2011 and 2012 was

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1 Assisted by Alison McKinney and Samantha Rothberg of Wilmer Hale LLP
nearly triple the long-term average, and the percentage of annual precipitation falling in heavy downpour events has increased by 71% in the Northeast and 37% in the Midwest. According to the United States’ 2014 National Climate Assessment, “[c]limate change, once considered an issue for a distant future, has moved firmly into the present.”

The primary driver of climate change is the increased concentration of greenhouse gases in the atmosphere as a result of human activity. Greenhouse gases prevent the heat that radiates from the Earth from escaping into space, keeping these gases trapped in the atmosphere where they contribute to a global warming effect. According to the IPCC, atmospheric concentrations of carbon dioxide, methane and nitrous oxide, the most common greenhouse gases, have “increased to levels unprecedented in the last 800,000 years,” primarily as a result of human activity. Fossil fuel combustion and other industrial activities have raised atmospheric levels of carbon dioxide from 280 parts per million (ppm) to 391 ppm in the past 150 years.

In the United States, a significant percentage of the greenhouse gas emissions that contribute to climate change are directly or indirectly produced by the building sector.

b. Buildings and Climate Change

Residential and commercial buildings are responsible for approximately 33% of total U.S. greenhouse gas emissions. However, they are only directly responsible for the 10% of emissions that result from fossil fuel combustion for heating and cooking needs, organic waste sent to landfills, wastewater treatment plants, and the release of fluorinated gases used in refrigerators and air conditioners. The remainder represents electricity-sector emissions resulting from electricity consumption in residential and commercial buildings. As the numbers illustrate, “[e]missions from commercial and residential buildings … increase substantially when emissions from electricity are included, due to their relatively large share of electricity consumption.”

According to the EPA, the building sector consumes 41% of the energy used in the United States. Furthermore, total primary energy consumption is expected to increase by 17% over 2009

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9 Id.
10 IPCC, Summary for Policymakers, supra note 2 at 11-12.
11 Id.
15 Id.
levels by 2025, fueled primarily by concomitant growth in population, households, and commercial floor space. Buildings also accounted for 72% of total U.S. electricity consumption in 2006, and this number is projected to rise to 75% by 2025. The U.S. Green Buildings Council estimates that if half of all new commercial buildings were built to be 50% more energy efficient, the United States would emit six million fewer metric tons of carbon dioxide annually – the equivalent of keeping one million cars off the road each year.

c. Government Responses to Climate Change

The most significant federal action to address climate change has come from the executive branch. In June 2014, President Barack Obama announced a proposed regulation that by 2030 will cut carbon pollution from power plants by 30 percent from 2005 levels, and in 2012, the Obama administration finalized ambitious clean cars standards that will cut greenhouse gas emissions from cars and light trucks in half by 2025. However, despite the serious threats posed by climate change, the federal government’s overall response has been lackluster at best. Congress has repeatedly failed to pass comprehensive climate change legislation. In fact, California youth groups recently filed suit against the U.S. government under the public trust doctrine for failing to address the climate change crisis, although the case was subsequently dismissed.

In the absence of a comprehensive federal climate change policy, states and cities have taken the lead, adopting a two-pronged approach: mitigation and adaptation. Mitigation measures focus on reducing carbon emissions to help prevent the worst effects of climate change. Adaptation measures, on the other hand, aim to make communities more resilient to those impacts of climate change that are likely inevitable. This article will focus on mitigation and adaptation measures that relate primarily to buildings and land use, although vehicles, power plants and heavy industry are also common targets of regulation.

II. Climate Change Mitigation: Tools to Reduce Carbon Emissions

Residential, public and commercial buildings pose an attractive target to state and local governments trying to reduce energy consumption and slash greenhouse gas emissions. Most

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governments focus on two primary policy tools: energy efficiency measures and clean energy measures. Energy efficiency measures encourage and, in some cases, require property owners to take steps to reduce the amount of energy consumed by their building. Clean energy measures generally involve programs to encourage property owners to install clean energy facilities, such as solar panels or wind turbines.

While states and cities have adopted a diverse array of policy mechanisms to further their energy efficiency and clean energy goals, several of those mechanisms have become increasingly common: green building codes, energy use disclosure programs, expedited permitting and preferential zoning, heightened efficiency standards for public buildings, energy efficiency and clean energy incentive programs, and community certification programs.

a. **Green Building Energy Codes**

Building energy codes increase the energy efficiency of buildings by setting minimum requirements for building components such as insulation, water use, heating and cooling systems, lighting, windows, and ventilation systems. Code requirements vary by region to account for climate differences and may, for example, require more insulation in very hot or cold areas to reduce energy consumption from heating and cooling systems. In 2009, the federal government moved to encourage states to adopt the most recent recommended building energy codes by making energy code adoption a condition for receipt of State Energy Program (SEP) funding under the American Recovery and Reinvestment Act. (Energy codes are generally adopted as a component of an existing state building code, although they may be adopted as a separate code.) Perhaps as a result of that condition to funding, 44 states currently have a commercial building energy code and 43 states have a residential building energy code. Of those states, 11 have adopted the most recent commercial code and nine have adopted the most recent residential code.

Most state and local building codes are keyed to the requirements of model building codes created by private standard-setting bodies. The two most commonly used codes are the International Energy Conservation Code (IECC) for residential buildings, and the American Society of Heating, Refrigerating, and Air Conditioning Engineers’ ASHRAE 90.1 code for commercial buildings. The IECC is promulgated by the International Code Council (ICC), a non-profit organization that promotes building safety and performance standards. Both codes are developed through a consensus-driven process in which industry experts, government officials, environmental advocacy groups, architects, engineers and academics are able to participate.

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28 Id.