

**U.S. HOUSE OF REPRESENTATIVES
SUBCOMMITTEE ON RESEARCH & TECHNOLOGY
AND SUBCOMMITTEE ON ENVIRONMENT
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
HEARING CHARTER**

Calm Before the Storm: Reauthorizing the National Windstorm Impact Reduction Program

Wednesday, December 4, 2019
2:00 p.m. – 4:00 p.m.
2318 Rayburn House Office Building

PURPOSE

On Wednesday, December 4, 2019, the Subcommittee on Research and Technology and the Subcommittee on Environment of the U.S. House of Representatives Committee on Science, Space, and Technology will hold a joint hearing titled, “*Calm Before the Storm: Reauthorizing the National Windstorm Impact Reduction Program.*” The purpose of this hearing is to review the activities of the National Windstorm Impact Reduction Program (NWIRP) and to consider opportunities and challenges to improved wind resilience and priorities for the next NWIRP reauthorization.

WITNESSES

- **Dr. Scott Weaver**, Director of the National Windstorm Impact Reduction Program, National Institute of Standards and Technology
- **Major General Lee Tafanelli**, Kansas Adjutant General, Director of Kansas Homeland Security and Director of Emergency Management
- **Dr. Delong Zuo**, Associate Professor of Civil Engineering, National Wind Institute, Texas Tech University
- **Mr. Ryan Colker**, Vice President of Innovation and Executive Director of the Alliance for National and Community Resilience, International Code Council

OVERARCHING QUESTIONS

- To what extent has NWIRP improved the understanding of windstorms, improved windstorm impact assessment, and reduced windstorm impacts?
- How does NWIRP facilitate interdisciplinary research, including across atmospheric science, engineering, and social sciences, and the translation of that research into reduced windstorm impacts?
- What are the additional needs in research, workforce, and infrastructure for improved wind resilience? How can NWIRP address those gaps?

- What is the role of public-private partnerships in improving wind resilience and how can NWIRP facilitate those partnerships?

BACKGROUND

Windstorms, including hurricanes, tropical storms, tornadoes, and thunderstorms, occur in all 50 states and many U.S. territories. These storms, combined with associated flooding, are the largest loss-producing natural hazard in the U.S. and caused over 5,000 fatalities and over \$1 trillion in economic losses between 1980 and 2017.¹ The average annual total economic loss for the 10-year period ending in 2015 caused by these windstorms was 73 percent of the total losses and 75 percent of insured losses caused by all hazards.² Severe windstorms can compromise national security when they inflict major damage to critical infrastructure, such as defense facilities, ports, airports, communication and power grids, critical manufacturing, financial services and nuclear facilities.³ According to the Congressional Budget Office (CBO), costs associated with hurricanes are forecast to increase more rapidly than the growth of the economy; annual losses from hurricanes will increase from 0.16 percent of the GDP to 0.22 percent of GDP by 2075.⁴ An April 2019 CBO report stated that residential, commercial and public sectors' annual losses from hurricane winds and storm-related flooding is expected to total \$54 billion.⁵

NATIONAL WINDSTORM IMPACT REDUCTION PROGRAM

The purpose of the National Windstorm Impact Reduction Program (NWIRP) is “to achieve major measurable reductions in the losses of life and property from windstorms through a coordinated Federal effort, in cooperation with other levels of government, academia, and the private sector, aimed at improving the understanding of windstorms and their impacts and developing and encouraging the implementation of cost-effective mitigation measures to reduce those impacts.”⁶ The National Institute of Building Sciences' “Natural Hazard Mitigation Saves: 2018 Interim Report” found that communities across the nation could see a benefit-cost ratio of \$10 for every \$1 invested in meeting common code requirements for wind mitigation. NWIRP was established in 2004 [P.L. 108-360]. When Congress reauthorized the program in 2015 in the National Windstorm Impact Reduction Act Reauthorization [P.L. 114-52] it amended the law to direct the National Institute of Standards and Technology (NIST) to be the lead agency rather

¹ Strategic Plan for the National Windstorm Impact Reduction Program, page 3.

² 2015 Annual Global Climate and Catastrophe Report, Impact Forecasting, Aon-Banfield, 2016
<http://thoughtleadership.aonbanfield.com/Documents/20160113-ab-if-annual-climate-catastrophe-report.pdf>

³ Strategic Plan, page 5.

⁴ Potential Increases in Hurricane Damage in the United States: Implications for the Federal Budget, CBO, June 2016. <https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/51518-hurricane-damage-onecol.pdf>

⁵ <https://www.cbo.gov/system/files/2019-04/55019-ExpectedCostsFromWindStorm.pdf>

⁶ National Windstorm Impact Reduction Program Act Reauthorization of 2015 [P.L. 114-52].

than the White House Office of Science and Technology Policy. Authorization for NWIRP expired in 2017.

PROGRAM AGENCIES AND COORDINATED BUDGET

The four program agencies under NWIRP are NIST, the National Science Foundation (NSF), the National Oceanic and Atmospheric Administration (NOAA), and the Federal Emergency Management Agency (FEMA). Research and activities under this program address three primary mitigation components: improved understanding of windstorms; windstorm impact assessment; and windstorm impact reduction. The 2015 NWIRP Act established an Interagency Coordinating Committee on Windstorm Impact Reduction (ICC) to oversee the planning and coordination of the program. The ICC is composed of the four program agencies plus the Office of Management and Budget and any other appropriate Federal agencies. Congress also requires the ICC to develop a coordinated budget for the program. The four program agencies carry out research and activities to achieve the goals of NWIRP; however, NWIRP does not appear as a line item in the agencies' budgets. The total authorization for the program across all four agencies is \$21.4 million for each of fiscal years 2015 through 2017.

NIST RESEARCH AND ACTIVITIES

As the lead agency for NWIRP, NIST is responsible for ensuring the program has the necessary components to promote windstorm risk reduction measures; supporting the development of performance-based engineering tools and the commercial application of such tools; requesting assistance from other Federal agencies as needed; coordinating Federal post-windstorm investigations; and issuing recommendations to assist in development of model codes. In addition to lead agency responsibilities, NIST also carries out research and development to improve model building codes, voluntary standards, and best practices for the design, construction, and retrofit of buildings, structures, and lifelines, such as utility and transportation infrastructure. Congress authorized \$4.12 million to be appropriated to NIST for each of fiscal years 2015 through 2017 to carry out activities under NWIRP. In FY 2019, NIST spent \$5.7 million for NWIRP activities. This figure reflects an allocation to support the Hurricane Maria Investigation.

Using its authority under the National Construction Safety Team Act and NWIRP, NIST announced in 2018 that it planned to study the impact of Hurricane Maria on Puerto Rico, focusing on the performance of critical buildings, electric and water infrastructure, and emergency communications.⁷ NIST also conducted an investigation of the 2011 Joplin Missouri tornado and made 16 recommendations for improvements to building design and construction in

⁷ <https://www.nist.gov/news-events/news/2018/05/nist-launches-study-hurricane-marias-impact-puerto-rico>

tornado-prone regions, improvement to emergency communications, and recommended codes and standards be adopted on a national basis for tornado resiliency.

NSF RESEARCH

NSF's NWIRP-related activities include supporting research in engineering and atmospheric sciences to improve understanding of the behavior of windstorms and their impact on buildings, structures, and lifelines and economic and social factors influencing windstorm risk reduction measures. NSF also supports windstorm research through its Natural Hazards Engineering and Research Infrastructure (NHERI) program that is a distributed, multi-user, national facility to provide the natural hazards engineering community with access to research infrastructure, including wind engineering experimental facilities, cyberinfrastructure, computational modeling and simulation tools, and research data. The wind tunnels supported under NHERI simulate hurricane and other strong winds; there is no tornado research facility in the United States to simulate vortex winds at scale. The Wind Engineering, Energy and Environment (WinDEE) Dome in Ontario at Canada's Western University is the only facility in the world to conduct tornado-wind simulations to scale. Congress authorized \$9.682 million to be appropriated for each of fiscal years 2015 through 2017 to NSF to carry out activities under NWIRP. In FY17, the NSF actual budget spending was \$47 million for NWIRP activities. NSF arrives at its actual spending level by adding up all relevant grants across the disciplines at the end of each fiscal year. It is a time-consuming process and NSF was not able to provide the Committee FY19 spending levels in time for this hearing.

NOAA RESEARCH

Under NWIRP, NOAA supports atmospheric science research to improve the understanding of the behavior of windstorms. NOAA conducts windstorm related research to help improve wind-related forecasts and warnings, with a focus on improving research to operations integration. NOAA has several activities at the National Weather Service (NWS) and the Office of Oceanic and Atmospheric Research (OAR) that contribute to the goals of NWIRP. These activities largely fall into two categories: hurricanes and local severe weather. Current hurricane related activities at NOAA that support the goals of NWIRP include the Hurricane Forecast Improvement Project and the operation of both the National Hurricane Center's Joint Hurricane Testbed and the Atlantic Oceanographic Meteorological Laboratory's Hurricane Research Division. Current severe weather (tornadoes, derechos, and severe thunderstorms) activities include improving hazardous weather and aviation weather forecasts through the continued development of "Warn on Forecast," operation of the Storm Prediction Center and its Hazardous Weather Testbed, operation of the National Severe Storms Laboratory, and operation of the Earth Systems Research Laboratory's Global Systems Division which includes the High-Resolution Rapid Refresh (HRRR) forecasts. Congress authorized \$2.266 million to be appropriated to NOAA for each of fiscal years 2015 through 2017 to carry out NWIRP activities.

In FY 2019, NOAA spent \$20.5 million in support of the goals of NWIRP. This figure includes hurricane supplemental funds for that year.

FEMA ACTIVITIES

To help achieve the goals of NWIRP, Congress tasked FEMA with supporting 1) the development of risk assessment tools and effective mitigation techniques; 2) windstorm-related data and collection analysis; 3) public outreach and information analysis; and 4) promotion of the adoption of windstorm preparedness and mitigation measures. FEMA's loss modeling software, Hazus, uses standardized methodology to estimate potential losses from natural hazards, including hurricanes. Under NWIRP, Congress also directed FEMA to work closely with national standards and model building code organizations, in conjunction with NIST, to promote implementation of research results and promote better building practices within the building design and construction industry. Congress authorized \$2.26 million to be appropriated for each of fiscal years 2015 through 2017 to FEMA to carry out activities under NWIRP. The agency spent \$300,000 towards NWIRP-related activities in FY 2019.

ADVISORY COMMITTEE RECOMMENDATIONS

The 2015 NWIRP Act directed NIST to establish an Advisory Committee on Windstorm Impact Reduction (ACWIR) with representatives from research and academic institutions, industry standards development organizations, emergency management agencies, state and local government, and business communities, including the insurance industry. The ACWIR report makes three recommendations for the program⁸, including:

- 1) place a greater emphasis on developing tools for evaluating the windstorm resistance of existing buildings and other infrastructure and for providing practical cost-effective guidance on retrofitting these buildings and other infrastructure to improve their windstorm resistance;*
- 2) conduct and promote social science research that provides a greater understanding of the portfolio of public policy approaches for promoting windstorm mitigation; and*
- 3) expand to consider all effects of land falling hurricanes, including water intrusion and water induced forces from waves, surge, and flooding, including rainfall related flooding, near the coast.*

⁸ Assessments of and Recommendations for the National Windstorm Impact Reduction Program and its Implementation, A Report from the National Advisory Committee on Windstorm Impact Reduction, September 2017.

https://www.nist.gov/system/files/documents/2017/10/12/nacwir_assessments_and_recommendations_for_nwirp.pdf