INFRASTRUCTURE

ON SHAKY GROUND

Urgent infrastructure needs are straining public resources.

BY JIM REED
It’s no secret that America’s infrastructure needs help. The 2017 Infrastructure Report Card, the latest iteration of the American Society of Civil Engineers’ oft-cited national assessment, gives America a D-plus for the condition of our system of basic public works. The report covers 16 categories including roads and bridges, transit, drinking water, solid waste and energy. That grade is the same one we got in 2013 (the assessment is done every four years), and in fact, since the report card started in 1998, we’ve never done better than a D overall.

The big question, as always, is how to pay for needed upgrades. The report estimates that $2 trillion is necessary over 10 years to close the gap between infrastructure needs and available funding.

The need for additional infrastructure funding is a long-running policy conversation at all levels of government. Yet, recent analyses show a slightly declining level of spending by federal, state and local governments since 2007, in inflation-adjusted dollars.

Modern, well-maintained infrastructure that efficiently transports people, goods and services forms the basis of smoothly running economies. Newer infrastructure eliminates public safety hazards, increases business productivity and job creation, and improves overall quality of life.

Those hopeful for a more significant federal role in infrastructure investment have been encouraged by a variety of proposals offered at the federal level in the last couple years to increase spending beyond base levels, but none has been enacted. In the meantime, states have continued to assess and fund their infrastructure needs through a variety of mechanisms.

States and localities pay for most of the capital improvements made to the nation’s infrastructure. According to the Congressional Budget Office, state and local governments accounted for $102 billion, or 59%, of total investment in 2017, while the federal portion was $72 billion, or 41%. In terms of operation and maintenance of public transportation, drinking water, wastewater and other critical infrastructure, the state and local share was $240 billion, or 90%, while the federal share was $27 billion, or 10%.

Certainly, state lawmakers are hopeful they will see additional federal funds for infrastructure use, but they know solutions will have to include state dollars and private investment.

Add ongoing environmental shocks—like increasing storm severity—to worn-out facilities and the rising cost of construction materials and you get a pressing need for better planning frameworks and new funding approaches. Solving this equation is essential to ensuring a better economy and quality of life for future generations of Americans.

The articles that follow will elaborate on state policies to improve infrastructure in transportation, energy transmission facilities, water and wastewater plants, and systems to mitigate and control flooding and other disaster-related damage.

Jim Reed directs NCSL’s Environment, Energy and Transportation programs.

Who Pays?

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- Federal: 10%
- State & Local: 90%

**Who Pays?**

- Federal: 41%
- State & Local: 59%

**Who Pays?**

- Federal: 10%
- State & Local: 90%

**Who Pays?**

- Capital improvements in all infrastructure: 41%
- Operation and maintenance of all infrastructure: 10%
Obstacles Ahead

As roads and bridges deteriorate and federal funding stagnates, states get creative with new revenue streams.

BY DOUGLAS SHINKLE

State lawmakers perennially hope for a massive infusion of federal transportation funding. But this year, just as certainly as the cherry blossoms along the National Mall fade each April, Congress and the Trump administration again failed to come to consensus on an infrastructure deal.

The federal government sends states more than $45 billion annually to help construct and maintain our nation’s roadways. But that hasn’t been enough. The federal-aid highway program and several competitive grant programs are guided by the FAST Act of 2015, which will expire in less than a year. Its reauthorization is anything but assured.

America’s roads, bridges and transit systems are in poor shape, threatening safety, lowering productivity and increasing long-term costs. There are more than 47,000 structurally deficient bridges in the U.S., and roads and transit are in even worse shape, according to the American Society of Civil Engineers and the American Road and Transportation Builders Association.

The federal gas tax of 18.4 cents per gallon has not been increased since 1993, and several factors including fuel efficiency, an increase in the number of electric vehicles and the rise of mobility services continue to weaken the gas tax system that has served the nation for 100 years.

Meanwhile, construction and labor expenses continue to rise because of higher material costs and a tight labor market. Construction costs are projected to increase 185.7% by 2030, according to the Institute on Taxation and Economic Policy.

All this has forced states to be creative in finding new ways to firm up the long-term solvency of transportation revenue and ensure safe, efficient infrastructure for all.

Refining the Gas Tax

Since 2013, 30 states and the District of Columbia have increased their gas tax. This year, for example, Alabama approved a 10-cent increase over three years, and Illinois passed a 19-cent increase that began in July. Twenty-two states have linked their gas taxes to inflation, creating variable-rate taxes. Georgia, for example,
linked its gas tax to construction costs and the average miles per gallon of new vehicles in the state.

**Tapping Into Tolling**

Federal law generally prohibits states from tolling existing federal-aid highways and interstates. A few Federal Highway Administration programs, however, allow states to apply for approval in certain circumstances. The Interstate System Reconstruction and Rehabilitation Pilot Program, for example, allows up to three states to convert an existing interstate into a toll “facility” to pay for its repair, with priority given to states that have enacted enabling legislation to toll.

The Wyoming Legislature considered tolling Interstate 80—a critical freight toll corridor—in an interim committee this summer, and lawmakers may introduce a bill next year that would be the first step toward applying for a pilot program slot.

The federal Value Pricing Pilot Program allows states to toll lanes on interstates to manage congestion. Oregon is seeking approval under the program to toll Interstates 5 and 205 to help lower congestion in the Portland metro area. Additionally, the General Tolling Program allows tolling of a corridor’s roads and bridges to pay for a capital investment in that corridor.

New York lawmakers enacted legislation this year creating the nation’s first zone-based congestion pricing program, which authorizes tolls when entering Manhattan’s Central Business District below 61st Street. The Legislature cited the need for a sustainable solution to fund repairs to the city’s subway, bus and commuter rail infrastructure, and to reduce congestion and air pollution.

In most cases, states may also convert high-occupancy vehicle lanes to high-occupancy toll lanes without federal approval, and they may toll new highways and those that aren’t interstates. Alabama, Florida, Kansas and Washington approved tolling legislation this year. Florida’s legislation authorized the design and construction of three regional toll roads, along with $70 million in funding over two years.

**Charging Road Users**

One hundred years after Oregon created the nation’s first gas tax, the state has started the first road usage charging program, called OReGO. The state is one of 15 in a consortium of Western states that have begun road usage charging programs or are conducting pilot programs or research. The consortium defines road usage charging as “a transportation funding model wherein all drivers are assessed a fee based on the number of miles they drive, rather than on how much gas they consume.” Many experts believe it may someday replace the gas tax. This year, Maine, Nevada, New Mexico, Oregon, Utah and Washington approved legislation creating road usage charging studies or pilots.

Oregon established OReGO within the state Department of Transportation in 2015. Participants currently pay 1.7 cents per mile and receive a credit against any state gas taxes paid. Drivers can choose from two private vendors or a vendor that operates a system for the state DOT. The program, previously limited to 5,000 vehicles, will soon be open to all vehicles that get at least 20 miles per gallon. The long-term goal is for OReGO to replace the gas tax system.

Oregon and Utah are putting particular focus on carrots and sticks to attract electric and hybrid vehicle owners to their programs to make up for the associated loss of gas tax revenue from such vehicles.

**A Federal Role**

The federal government has supported the states’ study and development of road user programs. Through the Surface Transportation System Funding Alternatives program, many states have received federal funding to study and pilot user-based alternative revenue mechanisms.

States will continue to experiment to find new and sustainable funding sources to maintain and improve America’s transportation system—while hoping, of course, for that needed increase in federal transportation funding.

Douglas Shinkle is director of NCSL’s Transportation Program. Jonathon Bates, NCSL’s transportation policy associate, and Ben Husch, director of NCSL’s Natural Resources and Infrastructure Committee, contributed to this story.
More Ebb Than Flow

Funding isn’t keeping pace with increasing demands for safe drinking water and wastewater removal.

BY DOUG FARQUHAR

At one time, state legislatures were not that involved in water infrastructure. The federal government set the standards and provided money; local water utilities followed the standards using the federal funds and revenue from their ratepayers. Legislatures would authorize their state agencies to follow federal laws such as the Clean Water Act and the Safe Drinking Water Act and relied on local utilities to ensure that drinking water was safe and that wastewater was disposed of properly.

Many of these laws were enacted in the 1970s, when the demands for safe drinking water and wastewater removal were lighter. But those demands have increased significantly since then, and the federal funds currently appropriated for water infrastructure are no longer enough to cover the costs.

Federal funding comes primarily through the Drinking Water State Revolving Fund and the Clean Water State Revolving Fund. Both programs are administered by the Environmental Protection Agency, which awards grants to states for each program based on their needs. The states provide a 20% match, and the funds work like infrastructure banks by providing low-interest loans to eligible recipients. States are responsible for the operation of their programs and may set loan terms and target the resources to fit their specific needs.

Widespread Water Woes

The infrastructure problems resulting from a lack of funding have been felt across the country. Although the legislatures weren’t directly responsible for them, recent crises quickly have become legislative problems.

Drinking water emergencies, during which a utility must shut off water to customers because of an environmental health hazard, have occurred in Charleston, W.V., Jackson, Miss., and Toledo, Ohio. Small towns such as Alamosa, Colo., and Worden, Mont., have had to ship in water supplies due to contamination.

The tragedy in Flint, Mich., is the best-known example. Flint’s change in April
2014 from water treated by the Detroit Water and Sewerage Department to water from the Flint River, exposed residents to elevated levels of lead and possibly caused an outbreak of Legionnaires’ disease, which killed 12 people.

“In the case of Flint we messed up,” says Michigan House Speaker Lee Chatfield (R). “There was a problem and the Legislature did not address it until it was too late.”

When it did respond, the Legislature created a joint committee through the Flint Water Public Health Emergency Act of 2016. The committee concluded that corrosive water from the Flint River leached lead from aging pipes into the water supply, poisoning between 6,000 and 12,000 children. Among the committee’s 35 recommendations were some to fortify the state’s water infrastructure, including requiring each community water supplier to complete an inventory of all water system components; replacing lead service lines and moving away from them in all communities; and establishing an Underground Asset Management Council to develop and advance a best-practice approach for water infrastructure systems.

“Michigan is defined by its water, both literally and figuratively,” says Senator Kim LaSata (R), who is sponsoring a water testing bill in response to the committee’s proposals. “We are going above and beyond to help prevent another Flint water crisis and to ensure contamination is identified and remedied quicker than ever before.”

Other states are facing similar water infrastructure concerns. California enacted legislation in 2007 to ensure the state’s water systems deliver an adequate and affordable supply of safe drinking water. Illinois’ new law, which supports green infrastructure solutions, calls for replacing lead components and improving wastewater treatment, flood control and stormwater management, among other actions. Indiana established the Water Infrastructure Assistance Fund and Program, and West Virginia lawmakers enacted legislation to protect sources of safe drinking water.

**On the Wastewater Side**

To combat stormwater surges and overflows, the New Jersey Legislature authorized the creation of local stormwater utilities. The act will improve stormwater infrastructure and management by allowing local utilities to upgrade and maintain their systems. North Dakota’s new law created a legislative management study on the installation, maintenance, testing and repair of sewage treatment systems.

In Wisconsin, Assembly Speaker Robin Vos (R) created the Speaker’s Task Force on Water Quality, which coincided with a declaration by Governor Tony Evers (D) that 2019 would be “the year of clean drinking water.” The task force is considering proposals to increase water quality staff at state agencies and county departments and to develop a grant program for counties to use to study well water. Task force members stress that action is vital to protecting property values, tourism and recreation.

“There’s so much that we could be doing and now’s our opportunity,” says Representative Katrina Shankland (D), a task force co-chair. “The long-term cost of doing nothing is much worse than the short-term cost of doing something.”

In Wisconsin, Representative Todd Novak (R) feels a similar urgency.

“We need to get a water plan in place,” he says. “We can’t keep doing this every two-year budget cycle. We need to figure out a sustainable way to keep water programs going.”

Doug Farquhar directs NCSL’s Environmental Health Program. Kristen Hildreth, a senior policy specialist with NCSL’s National Resources and Infrastructure Committee, contributed to this story.
Smart Power

Can technology make the electric grid better for consumers without leaving it vulnerable to cyberattacks?

BY DANIEL SHEA

The electric grid faces threats on several fronts—most pressing of which are cyberattacks and natural disasters. And, although it may seem counterintuitive, investments that are helping to make the grid more resilient to one of those threats are making it more vulnerable to the other.

Grid modernization is the catchall term for a wide variety of initiatives aimed at moving the analog, 20th century electric grid into the age of the smartphone. Many of these efforts involve the introduction of new “smart” components that enhance the flow of data to grid operators, providing them with heightened operational awareness and the ability to detect and correct grid anomalies before they lead to outages. Ultimately, these technologies help create a more reliable and efficient electric grid.

State legislators are enacting policies that encourage and facilitate grid modernization, often starting with the use of smart meters before addressing policies that allow grid operators to shape supply and demand. The pace of these changes, however, varies significantly by state and utility. In many cases, technological developments and consumer preferences are outpacing public policy.

Grid Vulnerability

This is where cybersecurity concerns come into focus, because even as these new technologies offer significant improvements in grid operations and enhance flexibility, they also substantially increase the grid’s vulnerability to potential attacks. Whereas two decades ago, operations and information technology were isolated from each other, these new pieces of internet-enabled hardware and software are located throughout the system, connecting operations and IT in ways previously unseen.

The federal government is addressing cybersecurity through the Federal Energy Regulatory Commission, the entity responsible for regulating the interstate transmission of electricity. The commission has developed and approved man-
datary cybersecurity standards for the bulk power grid, while the Department of Energy is developing a national energy cybersecurity plan that’s expected to be released late this year. Despite these federal cybersecurity standards, more than 80% of the grid’s total assets fall largely under state jurisdiction. States have begun addressing these vulnerabilities by creating task forces, establishing cybersecurity standards and reporting requirements, and preparing for service disruptions and emergencies. But one largely unresolved issue is how to adequately fund these programs.

Texas, for example, recently bolstered its cybersecurity oversight and granted utilities full authority to recover the costs of the program.

The need for substantial investments in more traditional infrastructure—namely, poles and wires—is only compounding the funding issue. One study found that 60% of U.S. distribution lines have surpassed their 50-year life expectancy, and current funding levels are nowhere near adequate for the amount of work needed. According to the American Society of Civil Engineers, at the current level of investment in the grid, there will be a funding gap of $136 billion for transmission and distribution systems by 2025.

To facilitate transmission, distribution and other grid modernization investments, the Indiana General Assembly recently enacted a law that allows utilities to recover costs on projects outlined and approved under long-term plans. The law eliminates the need for utilities to seek permission from state regulators to raise rates to fund these projects. It should make it easier for utilities to finance transmission and distribution improvements. But it has drawn criticism from consumer advocates who claim it amounts to handing utilities a blank check.

Ultimately, costs trickle down to customers who, regardless of whether the upgrades are necessary, don’t like seeing their rates go up.

### Building in Resiliency

Of course, the alternative is even more costly. The electric grid underpins modern society—it enables financial systems, health care and basic infrastructure to function. According to one study, basic power losses cost the U.S. economy close to $30 billion in lost output every year. Weather-related outages add significantly to that figure due to lost productivity and the need to rebuild communities and businesses, homes and lives. The 2018 wildfires in California—several of which were sparked by utility equipment—are estimated to have cost the state around $400 billion in economic losses.

With the threat from wildfires and hurricanes increasing, states have started to fund resiliency measures to help minimize damages and facilitate rapid recoveries. Florida lawmakers recently enacted a law to support utilities’ efforts to harden their infrastructure—including burying electric lines. Legislators in California and Nevada enacted laws bolstering utility disaster mitigation requirements, including cutting power to certain parts of the grid under dangerous conditions to prevent sparking wildfires like California did in October. Meanwhile, Hawaii, Maine, New Jersey and North Carolina all enacted measures to enable the rapid restoration of services.

Many of these efforts overlap with grid modernization initiatives, which can help utilities to identify system imbalances before outages occur and to quickly locate them when they do. Whether they bolster cybersecurity or strengthen the system against natural disasters, efforts to make the grid more reliable and resilient are going to cost money. The issue facing many state policymakers is how to balance the significant need for investment on several fronts with consumer concerns over rising electricity prices.

Daniel Shea is a senior policy specialist in NCSL’s Energy Program. Ben Husch, director of NCSL’s Natural Resources and Infrastructure Committee, and Kristen Hildreth, a senior policy specialist with NCSL’s National Resources and Infrastructure Committee, contributed to this story.
Deterring Disaster

As the costs of extreme weather events rise, states turn to mitigation and risk reduction.

BY KIM TYRRELL

Headlines in the last several years have been dominated by a spate of natural disasters, and unfortunately, no state has been immune. According to the National Oceanic and Atmospheric Administration’s National Center for Environmental Information, large-scale disasters cost the country $91 billion in 2018.

Data compiled by The Associated Press shows that 24 states have suffered about $1.2 billion in damages this year to roads, bridges, buildings, utilities and other public infrastructure from floods, storms and tornadoes.

Severe weather in the United States varies by region and season, but flooding affects nearly every state. Flood data, in fact, shows that inland states, near rivers, experience flooding more frequently than coastal states. Whether it’s the catastrophic but occasional flooding caused by hurricanes, or the frequent but less severe inundation of low-lying areas caused by inland rainstorms, both threaten millions of people and businesses.

For decades, the framework for dealing with calamities has centered on response and recovery, not on mitigation or risk reduction. As disaster recovery costs have risen for all levels of government, there has been a shift toward preventing damage rather than just repairing it. Many of these mitigation strategies require investing in strengthening infrastructure. In 2018, the National Institute of Building Sciences released a finding that for every $1 invested in disaster mitigation, future costs associated with loss are reduced by $6.

Traditionally, “infrastructure” has conjured up visions of concrete and steel, but when it comes to flooding, a combination of “gray” infrastructure (engineered solutions using concrete, steel and other materials) and “green” infrastructure (living shorelines, open space and wetlands restoration) can be the best antidote to disaster.

State Actions

So far this year, lawmakers in at least 31 states have introduced legislation related to flood control. In Texas, which is still recovering from 2017’s Hurricane Har-
vey, the Legislature passed seven bills to better prepare the state for future floods. Legislators took the unprecedented step of amending their state constitution to create a flood infrastructure fund to help pay for flood drainage, mitigation and control projects. One bill called for the “construction and implementation of nonstructural projects, including projects that use nature-based features, to protect, mitigate or reduce flood risk.” These investments will be made alongside traditional “gray” solutions such as stormwater drainage systems, levees and retention basins.

In response to record-setting floods in 2008, the Iowa General Assembly established a flood center at the University of Iowa College of Engineering. It works closely with the state Department of Natural Resources and other state and federal agencies. Over the last decade, it has become a leader in developing flood-resistant infrastructure projects. Legislators also created a competitive grant program to support infrastructure projects such as rebuilding, reconstructing and replacing buildings after disasters, and controlling, protecting against and preventing flooding.

A number of states, including Maryland, North Carolina and Virginia, which have suffered devastating floods in the last few years, are turning to science for help. They’re using research, data and new technologies such as LiDAR, a surveying tool that uses laser light to measure distances, to help guide infrastructure investments. LiDAR, which stands for light detection and ranging, can generate computer models that simulate floods, showing the most vulnerable areas.

### Federal Assistance

Paying for these infrastructure investments has been among states’ biggest obstacles. Until recently, federal funds mostly have targeted disaster response and recovery, leaving states with limited resources to make what are often costly investments.

Revolving loans, which have been used to fund water projects, have been gaining traction at the state and federal levels to fund flood-mitigation efforts. As recipients repay the low-interest loans, funding becomes available for other borrowers.

The federal Disaster Recovery Reform Act, which Congress passed in October 2018, is considered the most comprehensive disaster reform legislation since Hurricane Katrina. The new law created a federal funding stream known as BRIC (Building Resilient Infrastructure and Communities) by setting aside up to 6% of estimated disaster expenses. The funds will be available to state, local, tribal and territorial entities on a competitive basis for use on mitigation and resilience projects before disaster strikes.

BRIC is expected to provide a more reliable stream of funding, allowing states to more consistently plan and execute mitigation programs. Application guidance will become available once FEMA’s rulemaking and public comment period has been completed.

In the meantime, some states are finding ways to pay for their own improvements. Virginia lawmakers, for example, enacted legislation this year that provides loans to strengthen shorelines and improve the management of stormwater. The law gives preference to natural or nature-based solutions and living shorelines, which combat soil erosion with organic materials like sand, wetland plants, oyster reefs, submerged aquatic vegetation, stones and coir fiber.

Indiana has a similar loan program, funded through legislative appropriations, to help construct and widen stream channels, and to build and repair dikes and levees, among other projects.

As states prepare for what many consider to be the new normal when it comes to flooding and other natural disasters, there is an increased willingness among federal, state and local governments to invest in building more resilient communities, ones that can better withstand disasters and reduce or eliminate the associated economic, social and environmental impacts.

Kim Tyrrell is director of NCSL’s Environment Program. Lucia Bragg, a policy specialist in NCSL’s Washington, D.C., office, contributed to this story.

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**Mitigation Saves**

Every $1 spent on mitigation saves $6 on future disaster losses.