



Committee on Transportation and Infrastructure
U.S. House of Representatives
Washington, DC 20515

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February 22, 2019

SUMMARY OF SUBJECT MATTER

To: Members, Committee on Transportation and Infrastructure
From: Staff, Committee on Transportation and Infrastructure
Re: Full Committee Hearing on “Examining How Federal Infrastructure Policy Could Help Mitigate and Adapt to Climate Change”

PURPOSE

The Committee on Transportation and Infrastructure (Committee) will meet on Tuesday, February 26, 2019, at 10 a.m. in HVC-210, the Capitol Visitors Center, to receive testimony related to “Examining How Federal Infrastructure Policy Could Help Mitigate and Adapt to Climate Change.” The purpose of this hearing is to examine the role the transportation sector plays in global warming, understand the dual track approach of mitigation and resiliency, and learn from individuals in the public and private sectors whom have demonstrated pragmatic solutions for reducing carbon emissions and building resilient infrastructure.

The first panel will focus on ways to mitigate the effects of climate change, by reducing carbon emissions to reduce the accumulation of greenhouse gases in the atmosphere. The Committee will hear from representatives of the California Air Resources Board, Georgetown Climate Center, Stephen M. Ross School of Business at the University of Michigan, Electrification Coalition, and Airlines for America. The second panel will address how to make infrastructure more resilient and protect people, infrastructure, and ecosystems from the impacts of climate change. The Committee will hear from representatives of the Center for American Progress, McWane Inc., Center for Strategic and International Studies, and The Nature Conservancy.

BACKGROUND

The United Nations Intergovernmental Panel on Climate Change (IPCC) estimates that human activities have caused approximately 1.0°C of global warming above pre-industrial levels, and are likely to cause a 1.5°C increase between 2030 and 2052 if warming continues at the current rate.¹ Impacts from global warming are already apparent.² Unless we take action to quickly reverse course, these trends will persist for centuries and will continue to cause further long-term changes to the environment, such as sea level rise, changing precipitation patterns, more acidic oceans, and increasing frequency and intensity of extreme weather events.³

¹ Global warming of 1.5°C: Summary for Policymakers. Intergovernmental Panel on Climate Change. October 2018.

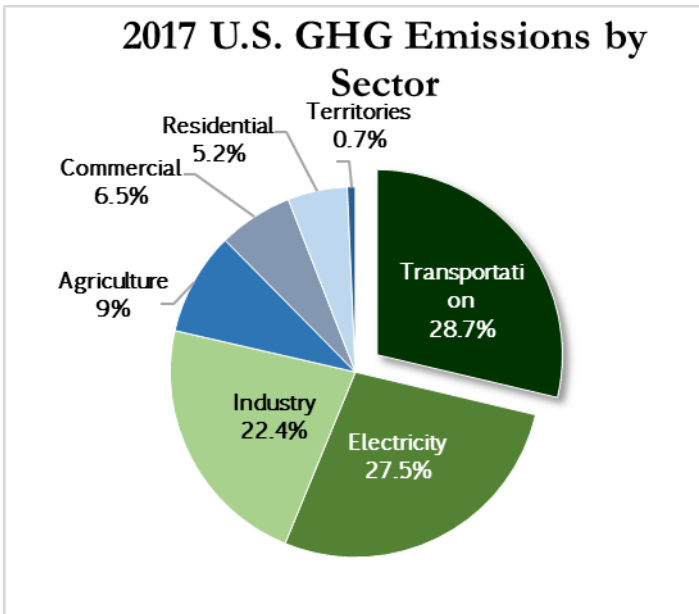
² Ibid.

³ Ibid.

MITIGATION

The U.S. Transportation Sector's Contribution to Global Warming

In 2017, the emissions from transportation accounted for about 28.7 percent of total U.S. greenhouse gas emissions, making it the largest contributor of U.S. greenhouse gas emissions.⁴ Historically, electricity generation has been the largest contributor to greenhouse gas emissions, but the replacement of many coal plants with cheaper natural gas and rising vehicle miles traveled (VMT) has recently pushed transportation into the forefront as the largest contributor.

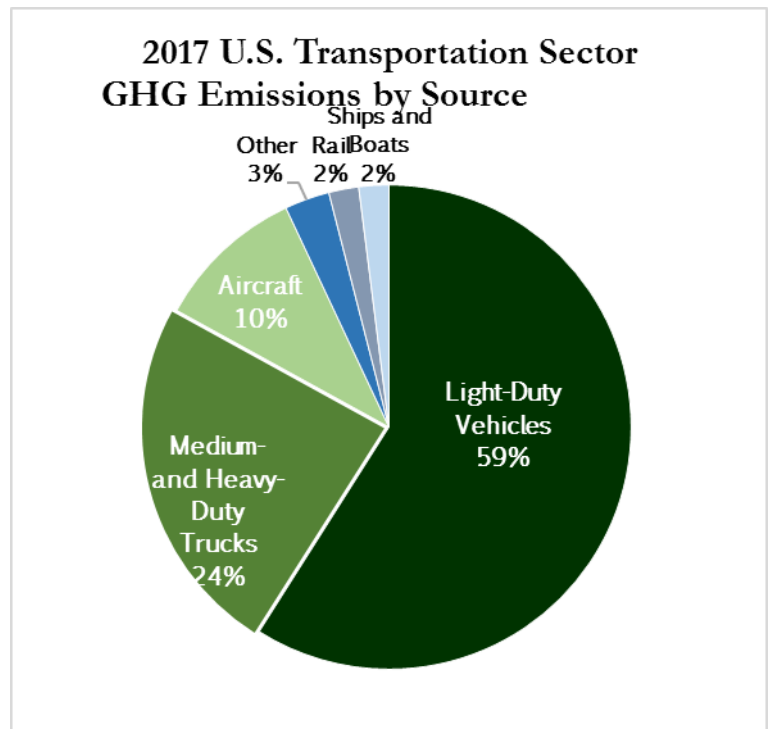


Within the U.S. transportation sector, passenger vehicles and freight trucks added together account for 83 percent of greenhouse gas emissions. Aviation contributes only 10 percent of emissions. Other modes such as rail and shipping play a minor role.⁵

Passenger Vehicles, Light-duty Vehicles, and Freight Truck Mitigation

There are three methods to reduce emissions from passenger vehicles and trucks, which combined account for 83 percent of greenhouse gas emissions, and a robust decline in emissions will require all three methods.

- 1) Improved Vehicle Efficiency – Reducing the amount of fuel necessary to move a vehicle will reduce greenhouse gas emissions. Traditionally, Congress has used CAFE standards to reduce fuel consumption and related carbon emissions, although the current Administration is considering changes to these standards with a final rule pending.⁶ CAFE standards are within the jurisdiction of the Energy and Commerce Committee.
- 2) Switch to Fuel with Less Carbon: Shifting away from fossil fuels and towards electricity, fuel cells, biodiesel, and fossil fuels with less carbon content than gasoline or diesel can reduce emissions. In the current market place, electrification is viewed as the most plausible replacement for fossil fuel and has the lowest carbon profile.



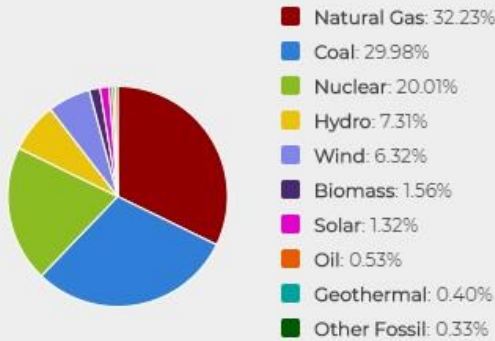
⁴ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017. Environmental Protection Agency. February 2019. Table 2-10.

⁵ Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017. Environmental Protection Agency. February 2019. Table 2-13.

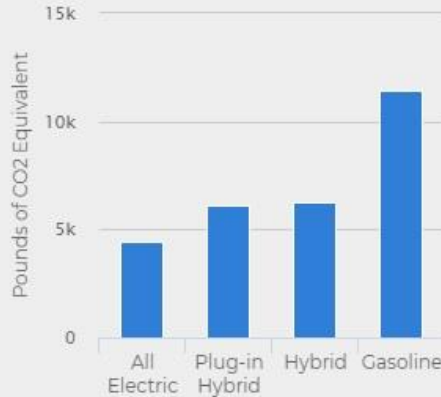
⁶ <https://www.nhtsa.gov/corporate-average-fuel-economy/safe>

National Carbon Emissions by Vehicle Type

Electricity Sources



Annual Emissions per Vehicle



To find the impact of carbon reduction from switching to a hybrid or electric car in your state see this link: https://afdc.energy.gov/vehicles/electric_emissions.html

- 3) Reduce Vehicle Miles Traveled. Reducing the number of miles driven will reduce carbon emissions. Providing incentives for more efficient travel planning, eliminating the need for some trips, and shifting to more efficient modes will reduce vehicle miles traveled.

Aviation Mitigation

Aviation emissions come largely from commercial carrier jet fuel. According to the IPCC, aviation represents approximately 2 to 3 percent of the total annual global CO₂ emissions from human activities.⁷ While the United States does not currently have standards for aircraft emissions (generally or carbon dioxide specifically), the Federal Aviation Administration (FAA) supports several emission-reduction programs and the industry has taken on initiatives to reduce emissions.

The International Civil Aviation Organization (ICAO), a specialized UN agency made up of 192 member states, is the primary international body for regulating global aviation standards. In 2016, ICAO reached an agreement on the (1) first international carbon dioxide standards for newly built aircraft and (2) first-of-its-kind carbon offsetting scheme known as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).⁸ CORSIA is an emissions offsetting program aimed at achieving carbon neutral growth after 2020 for operators that fly internationally and produce more than 10,000 metric tons of annual carbon dioxide emissions.

⁷ European Union Aviation Safety Agency, *European Aviation Environmental Report 2019*, available at:

https://www.easa.europa.eu/eacr/system/files/usr_uploaded/219473_EASA_EAER_2019_WEB_HI-RES.pdf; see also, EPA's most recent final GHG inventory report, issued in April 2018, US commercial aviation is only 2 percent of the nation's domestic GHG emissions inventory. *EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2016*, available at: <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016>

⁸ International Civil Aviation Organization, *ICAO Council Reaches Landmark Decision on Aviation Emissions Offsetting* (June 27, 2018), available at <https://www.icao.int/Newsroom/Pages/ICAO-Council-reaches-landmark-decision-on-aviation-emissions-offsetting.aspx>

CORSIA has the support of the United States, U.S. airline industry, and 73 other ICAO member nations representing 75.96 percent of the international aviation industry.⁹

FAA Emission Reduction Programs and Initiatives

- 1) CORSIA Implementation – To comply with the recent ICAO agreements, the FAA and the Environmental Protection Agency (EPA) are required to develop regulations regarding aircraft design standards, emissions data collection, and monitoring. In addition, the agencies are tasked with implementing the new carbon offsetting system for U.S aircraft operators. Unlike how the Clean Air Act sets standards for other modes, here, the EPA must consult with the FAA on developing any emissions standards for aircraft, giving the FAA a central role in creating and enforcing the new ICAO environmental standards.¹⁰
- 2) Continuous Lower Energy, Emissions and Noise (CLEEN) Program – The CLEEN program is a collaboration between the FAA and industry to drive the development of new aircraft and engine technologies that increase fuel efficiency, reduce emissions, decrease noise, and advance sustainable aviation fuels. During the first iteration of CLEEN, the FAA partnered with five companies and had a total investment value of more than \$250 million by end of the original agreement in 2015.¹¹ Through cost-sharing partnerships with industry, CLEEN projects developed technologies that reduce noise, emissions, and fuel burn. The second iteration, CLEEN II, currently has the FAA partnered with eight companies and is scheduled to continue through 2020.
- 3) Voluntary Airport Low Emissions (VALE) Program – Through participation in the Voluntary Airport Low Emissions (VALE) Program, airports can use Airport Improvement Program (AIP) funds and Passenger Facility Charge (PFC) revenue to finance low-emission vehicles, refueling and recharging stations, gate electrification, and other airport air quality improvements. Through September 2018, this program funded 105 projects at 51 airports and is expected to reduce ozone emissions by 1,192 tons per year over the next five years.¹²
- 4) NextGen Implementation – The FAA continues to develop and implement NextGen technologies and procedures to modernize the air traffic control system. NextGen programs include Performance-Based Navigation procedures (GPS-satellite based flight paths) and Terminal Flight Data Manager (TFDM) deployment (a surface management solution), which will reduce aircraft fuel burn and create a more predictable and efficient flight and ground transportation system at airports.¹³ The TFDM system alone is expected to create 313 million gallons of fuel savings and reduce more than three million metric tons of carbon emissions over the life of the system.¹⁴
- 5) Commercial Aviation Alternative Fuels Initiative (CAAIFI) – CAAIFI is a coalition of airlines, aircraft and engine manufacturers, energy producers, researchers, international participants, and U.S. government agencies working

⁹ National Business Aviation Association, *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA): Introduction & Expectations on the Submission of Emissions Monitoring Plan* (Oct. 16, 2018), available at

https://nbaa.org/wp-content/uploads/events/20181011_Overview-of-CORSIA-EMP_NBAA-BACE-2018.pdf

¹⁰ See ICAO, *supra* note 10.

¹¹ Federal Aviation Administration, *Continuous Lower Energy, Emissions and Noise (CLEEN) Program* (2018), available at

https://www.faa.gov/about/office_org/headquarters_offices/apl/research/aircraft_technology/cleen/

¹² Federal Aviation Administration, *Voluntary Aviation Low Emissions Program (VALE)* (2018), available at

<https://www.faa.gov/airports/environmental/vale/>

¹³ United States. Cong. House. Committee on Transportation and Infrastructure. Subcommittee on Aviation. *Hearing on Putting U.S. Aviation At Risk: The Impact of the Shutdown Feb. 13, 2019*. 116th Congress 1st sess. p. 12 (statement of Paul Rinaldi, President, National Air Traffic Controllers Association).

¹⁴ *Id.*

to promote alternative jet fuels for commercial aviation. CAAFI has led efforts in research and development, environmental assessment, fuel testing, and demonstration and commercialization of alternative aviation fuels. CAAFI efforts contributed to the creation of testing protocols and new alternative fuel specifications that have enabled approvals for aviation to use new fuels in commercial service. According to the FAA, this is helping to pave the way to large-scale production and use of these fuels. This leadership has also helped make aviation a major target market for the alternative fuels sector.¹⁵

Commercial Aviation

U.S. airlines have increased fuel efficiency by more than 125 percent between 1978 and 2017, and they have moved 28 percent more passengers and cargo in 2016 than 2000, using 3 percent less fuel.¹⁶ This reflects the industry's interest in maximizing fuel efficiency, largely attributed to the fact that fuel consistently ranks as their largest or second largest expense.¹⁷ Furthermore, the U.S. airline industry has committed to ICAO goals to increase fuel efficiency and reduce its environmental footprint. These goals include (1) achieving annual fuel efficiency improvement of 1.5 percent starting in 2010, (2) achieving carbon neutral growth starting in 2020, and (3) reducing net carbon dioxide emissions by 50 percent over 2005 levels by 2050.¹⁸

To achieve these goals, airlines are investing in fleet design standards with greater fuel efficiency, prioritizing the adoption of NextGen technologies, and developing industry coalitions such as the CAAFI to promote and deploy sustainable aviation fuels within the commercial aviation industry.¹⁹

Maritime Mitigation

The maritime industry is taking steps to mitigate its environmental impacts. Overall, the maritime industry is responsible for approximately 2.6% of global CO₂ emissions from fossil fuel uses.²⁰ However, the industry is working to reduce those emissions through several means, including slow steaming, conversion to low sulfur fuels, and the implementation of mandatory emission reductions in 2020. There has been worldwide cooperation across the maritime industry to pursue that goal.

RESILIENCY

The impacts of climate change such as rising sea levels and extreme weather events can have a serious impact on our ports, airports, rail lines, roads, bridges, tunnels, locks, canals/channels, waste water systems, transit systems, pipelines, public buildings, and other critical infrastructure. Climate trends affect the design of transportation infrastructure, which is expensive and designed for long life (typically 50 to 100 years). As climatic conditions shift, portions of this infrastructure will increasingly be subject to climatic stresses that will reduce the reliability and capacity of transportation systems and other infrastructure.

¹⁵ United States Aviation Greenhouse Gas Emissions Reduction Plan, submitted to ICAO, June 2015. *Available at:* https://www.icao.int/environmental-protection/Lists/ActionPlan/Attachments/30/UnitedStates_Action_Plan-2015.pdf

¹⁶ Airlines for America, *Policy Priority: Energy and the Environment* (2018), available at <http://airlines.org/policy-priorities-learn-more/#energy>

¹⁷ See Victoria Bryan, *Higher Wages, Fuel Prices Turn Up Cost Pressure on Airlines*, Reuters, Feb. 14, 2018, available at <https://www.reuters.com/article/us-airlines-wages-inflation-analysis/higher-wages-fuel-prices-turn-up-cost-pressure-on-airlines-idUSKCN1FY292>

¹⁸ Airlines for America, *A4A's Climate Change Commitment*, available at <http://airlines.org/a4as-climate-change-commitment/>

¹⁹ CAAFI is a coalition of airlines, aircraft and engine manufacturers, energy producers, researchers, international participants and U.S. government agencies working to promote alternative jet fuels for commercial aviation.

²⁰ The International Council on Clean Transportation, *Greenhouse Gas Emissions From Global Shipping, 2013-2015 (October 2017)*.

Highways

Climate resiliency activities are eligible for Federal Highway Administration (FHWA) funding, including vulnerability assessments and design and construction of projects or features to protect assets from damage associated with climate change. The Moving Ahead for Progress in the 21st Century (MAP-21) Act (P.L. 112-141) required states to develop risk-based asset management plans for the National Highway System and to consider alternatives for facilities repeatedly needing repair or replacement with federal funding. The Fixing America's Surface Transportation (FAST) Act (P.L. 114-94) added a new requirement for states and metropolitan planning organizations consider projects and strategies to “improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation” as part of their planning process.

Water Resources

The United States has over 95,000 miles of coastline and approximately 3.4 million square miles of ocean within its territorial sea. Some 53 percent of the total U.S. population lives on the 17 percent of the land in the coastal zone, and these areas become more crowded every year. Demands on coasts are increasing, and as coastal areas become more developed, these communities are vulnerable to hurricanes, storm surges, and flooding events.

Similarly, inland communities are vulnerable to a changing climate, especially communities that rely on rivers and streams, and associated water resources infrastructure, for transportation, water supply, power, and flood protection. For example, in 2017, the U.S. Army Corps of Engineers Institute for Water Resources released a report on the impacts of climate change to the Ohio River Valley – home to more than 27 million people who live within this 204,000 square mile area.²¹ This report modeled how increasingly potent storms could cause increased river levels and the likelihood of flooding in low-lying areas; how more frequent and heavy droughts could reduce river volumes in localized areas, adversely impacting navigation and power generation that all rely on river flows; and the possible economic losses from the potential events.

Water Resiliency Accomplishments

Through the biennial Water Resources Development Acts, the Committee has taken initial steps to ensure that the impacts of climate change are taken into account in the planning, design, and construction of water resources development projects, such as flood risk reduction projects and hurricane and storm damage reduction projects, as well as to promote greater use of natural and nature-based infrastructure systems that seek to mimic nature's resiliency and reduce the effects of extreme weather events, and seek to develop integrated water resources projects that address multiple project purposes. Similarly, the Committee amended the Clean Water Act in the *Water Resources Reform and Development Act of 2014* (P.L. 113–121) to make projects increase the resiliency of water-related infrastructure from the impacts of natural and man-made disasters, including extreme weather events and sea-level rise.

FEMA Resiliency Accomplishments

In 2017, Executive Order 13690—the Federal Flood Risk Management Standard (FFRMS), which amended the longstanding floodplain management Executive Order 11988, was repealed. In 2018, Congress enacted language in the John S. McCain National Defense Authorization Act (NDAA) for Fiscal Year 2019 (P.L. 115-232) to establish minimum flood mitigation requirements for all military construction within the 100-year floodplain.

²¹ U.S. Army Corps of Engineers and Ohio River Basin Alliance, *Ohio River Basin – Formulating Climate Change Mitigation/Adaptation Strategies through Regional Collaboration with the ORB Alliance* (May 2017), available at https://www.lrh.usace.army.mil/Portals/38/docs/orba/USACE%20Ohio%20River%20Basin%20CC%20Report_MAY%202017.pdf.

The FFRMS was developed with significant interagency coordination during the Obama Administration. It was intended to assist in reducing the risk and cost of future flood disasters by ensuring that Federal investments in and affecting floodplains were constructed to better withstand the impacts of flooding. The FY19 NDAA language (Sec. 2805(a)(4)) is a similar step toward resiliency—albeit limited to the Department of Defense—requiring construction of non-mission critical buildings to two feet above the base flood elevation (BFE) and construction of mission-critical buildings to three feet above the BFE.

Congress advanced two additional provisions to incentivize greater resiliency for future projects receiving Federal funding via the Federal Emergency Management Agency (FEMA).

First, in the Disaster Recovery Reform Act (DRRA) of 2018 (P.L. 115-254), the Committee authorized the National Public Infrastructure Pre-Disaster Mitigation (PDM) fund which will be funded as a six percent set aside from disaster expenses. This will be a more consistent stream of funding for PDM, allowing for greater investment in public infrastructure mitigation before a disaster. Additionally, DRRA clarifies what may be eligible for mitigation funding, ensuring Federal investments are cost effective and reduce risk. Until enactment of DRRA, PDM grants were inadequately and inconsistently funded by annual and supplemental appropriations.

Second, in the Bipartisan Budget Act (BBA) of 2018 (P.L. 115-123), Congress authorized the President to adjust the Federal cost share for FEMA Public Assistance grants on a sliding scale for States and Tribes that have invested in measures that increase readiness for, and resilience from, a major disaster (Sec. 20606).

Maritime Resiliency

The U.S. Arctic, as defined in statute²², encompasses U.S. territory north of the Arctic Circle and along the Alaskan coast, including the Aleutian Islands. Three Arctic seas - the Bering, the Chukchi, and the Beaufort - border Alaska, and these seas have historically been frozen for more than half the year. The U.S. Arctic Exclusive Economic Zone contains 568,000 square nautical miles (SNM), of which less than half is considered by NOAA to be “navigationally significant.” The National Oceanic and Atmospheric Administration (NOAA) has designated 38,000 SNM of the navigationally significant areas as survey priority locations in the Arctic and estimates that it could take up to 25 years to conduct modern hydrographic surveys in the priority locations, if resources remain at their current level.²³

Currently, most cargo ship traffic is not trans-Arctic; rather it is regional, focusing on the transport of natural resources and general cargo to and from widely dispersed communities. While there has been a recent increase in shipping activity, that increase is more related to a rise in commodity prices than with the melting of Arctic ice.²⁴ However, the January 2019 Arctic sea ice extent was the sixth smallest in the 41-year record, six percent below the 1981-2010 average.²⁵ While all areas of the Arctic are seeing increased vessel activity, the Northern Sea Route along the Eurasian Arctic coast continues to account for the bulk of Arctic shipping activity.²⁶

Numerous governmental and academic reports have identified infrastructure and operational challenges to maritime transportation in the U.S. Arctic, including limited satellite coverage and architecture to support voice and data communications, the lack of a deep-draft port (accommodating ships with a draft of up to 35 feet), hazardous weather and ice conditions, and the lack of channel marking buoys and other floating visual aids to navigation,

²² The Arctic Research and Policy Act of 1984, as amended (Public Law 98-373).

²³ NOAA National Ocean Service, <https://oceanservice.noaa.gov/economy/arctic/>, accessed February 19, 2019.

²⁴ Ronald O'Rourke, Congressional Research Service. *Changes in the Arctic: Background and Issues for Congress*. February 7, 2019.

²⁵ National Snow & Ice Data Center, <https://nsidc.org/arcticseaicenews/>, accessed February 19, 2019.

²⁶ O'Rourke.

which are not possible due to continuously moving ice sheets.²⁷ In order to ensure safe and efficient maritime transportation in the region, it is necessary to conduct surveys to improve nautical charts, improve communications capabilities, improve weather forecasting and modeling, construct a deep-draft U.S. Arctic port, and develop community and regional emergency response networks in preparation for vessel and aircraft accidents and environmental damage related to increased ship traffic and industry.

While climate change is causing the Arctic to become an emergent area, it will not solely affect the polar regions. Rising sea level projections mean that port infrastructure at all latitudes could be at risk of inundation, higher storm surge, and loss of economic function costing hundreds of millions if not billions of dollars to mitigate threats or rebuild/relocate existing infrastructure.

²⁷ Arctic Council (2009) *Arctic Marine Shipping Assessment*; U.S. White House (2013) *National Strategy for the Arctic Region*; U.S. Government Accountability Office (2014) *Maritime Infrastructure: Key Issues Related to Commercial Activity in the U.S. Arctic over the Next Decade*; Alaska Arctic Policy Commission (2015) *Final Report*; U.S. Committee on the Marine Transportation System (2016) *A Ten-Year Prioritization of Infrastructure Needs in the U.S. Arctic*; Council on Foreign Relations (2017) *Arctic Imperatives, Reinforcing U.S. Strategy on America's Fourth Coast*; Center for Strategic and International Studies (2017) *Maritime Futures, the Arctic and the Bering Strait Region*; Homeland Security Operational Analysis Center (2018) *Identifying Potential Gaps in the U.S. Coast Guard Arctic Capabilities*; U.S. Committee on the Marine Transportation System (2019) *Revisiting Near-Term Recommendations to Prioritize Infrastructure Needs in the U.S. Arctic*.

WITNESS LIST

Panel I

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Panel II

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