Establish a National Coastal Climate Initiative to Protect and Enhance our Coastal Ecosystems and Economies

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America's coastal ecosystems, economies, and infrastructure are already threatened by effects of global climate change, including rising sea levels and stronger storms. Efforts to plan for coastal sustainability and resilience—or to harness the tremendous potential of our coasts for greenhouse gas reduction and U.S. energy security[1]*—are limited by the difficulty of predicting the impacts of climate change across these complex and diverse regions. The U.S. Department of Energy (DOE) should establish a national coastal climate initiative (NCCI) to improve our nation's understanding of risks and opportunities associated with climate change and our coasts. NCCI will assemble coastal climate scientists and engineers across the nation to develop and deploy state-of-the-art measurement, modeling, and analysis capabilities that can be used to inform local, state, regional, and federal coastal sustainability and resiliency planning efforts.*[2]

Projecting the impacts of climate change on our coasts and evaluating different options for enhancing their resilience and sustainable energy potential is difficult due to the complexity and diversity of coastal regions. The DOE national laboratories have the capabilities and experience to address these challenges. Efforts across both the fundamental and applied science programs within DOE, including projects led by multiple laboratories across the DOE complex, have recently begun that will contribute to better understanding coastal opportunities and vulnerabilities.

In 2019, DOE's Office of Science Biological and Environmental Research program (BER) established a coastal science program to understand key coastal processes, hazards, and responses. DOE's Integrated Coastal Modeling project was initiated in 2019 with a focus on the mid-Atlantic region. This year, BER established a program in Coastal Observations, Mechanisms, and Predictions Across Systems and Scales which includes a major expansion of measurement capabilities in the Chesapeake Bay and Lake Erie, along with new computational resources and modeling activities. These efforts are designed to enhance our predictive understanding of key coastal systems.

DOE is also investing in technologies and strategies to better utilize our oceans and coasts as part of the climate change solution. For example, DOE's Energy Efficiency and Renewable Energy Office (EERE)—through its Wind Energy and Water Power Technologies Offices—is investing in offshore energy technology R&D and energy innovation to support decarbonization and new opportunities in the $1.5 trillion "Blue Economy."

DOE's coastal efforts have focused on a few key regions and technologies with activities spread across the agency. Given the importance of our coastal regions, a coordinated, national-scale effort is needed to better understand the impacts, challenges, and opportunities that our coastal communities face due to a changing climate.

Recommendation #1: Expand DOE's existing coastal research, development, and deployment efforts to establish a National Coastal Climate Initiative.

The NCCI should include measurement, modeling, and technology development activities on the East, West, and Gulf Coasts, in the Great Lakes region, and in Alaska and the U.S. islands. In each region, NCCI researchers will focus on developing an improved understanding of current and potential future impacts on coastal infrastructure, ecosystems, and other human and natural systems, as well as on options for enhancing resilience and adapting to

[1] Ove Hoegh-Guldberg et al., *The Ocean as a Solution to Climate Change: Five Opportunities for Action* (Washington, DC: World Resources Institute, 2019), https://oceanpanel.org/sites/default/files/2019-10/HLP_Report_Ocean_Solution_Climate_Change_final.pdf.

[2] Environmental and Energy Study Institute, *A Resilient Future for Coastal Communities: Federal Policy Recommendations from Solutions in Practice* (2020).

anticipated changes. This research will need to account for the complex and highly interconnected nature of coastal systems by developing and deploying state-of-the-art observations and modeling capabilities spanning a wide range of scales and processes.

Recommendation #2: Expand DOE's Powering the Blue Economy initiative to enable sustainable energy production.[3]

Ocean energy technologies, more sustainable maritime transportation systems, and engaged coastal communities will be critical for meeting U.S. decarbonization goals as well as promoting economic growth. An expanded approach, building on initial efforts, is needed to accelerate R&D and overcome deployment hurdles. In addition to expanding renewable energy resources, ocean and coastal energy sources could ease current energy system constraints, bolster energy resilience, and promote sustainability development and equitable outcomes in coastal communities. A major and sustained effort, working in partnership with industry, will be needed to develop, test, and deploy these technologies and to understand their interactions with local and regional economies, ecosystems, and energy systems.

Recommendation #3: Fully integrate NCCI with complementary programs at other federal agencies.

In addition to improving coordination across DOE offices, the Secretary of Energy should engage with counterparts at other agencies to ensure that NCCI leverages and informs the nation's broader coastal R&D activities. Key partners include the other agencies in the U.S. Global Change Research Program, including the National Oceanic and Atmospheric Administration, the National Science Foundation[4], the U.S. Geological Survey, the Environmental Protection Agency, the National Aeronautics and Space Administration, the Department of Homeland Security, and the Department of Defense. International coordination is needed to address issues of national security, international trade, disaster relief, and diplomacy.

Recommendation #4: Establish partnerships between DOE and coastal decision-makers to connect NCCI data and recommendations with planning efforts.

NCCI will assemble multidisciplinary research teams with specialized local and regional perspectives, combined with a coordinated set of cutting-edge capabilities and resources that are available to all sites and regions. DOE will need to partner with local and state governments, regional entities, and non-governmental organizations to better understand the challenges and opportunities facing different coastal regions and to inform climate adaptation and resilience planning efforts across a wide range of sectors and scales. Building those connections will ensure that DOE's basic and applied research efforts are leveraged to inform better strategies and techniques that coastal communities can employ to predict and manage the impacts of global change and sustain their economic productivity for future generations.

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[3] DOE Office of Energy Efficiency and Renewable Energy, *Powering the Blue Economy: Exploring Opportunities for Marine Renewable Energy in Maritime Markets* (2019), https://www.energy.gov/eere/water/downloads/powering-blue-economy-report.

[4] For example, "Coastlines & People (CoPe)" (accessed November 13, 2020), https://coastlinesandpeople.org/.