



CLIMATE ACTION 2030

Department of the Navy



Top left: US Marine Corps Sgt. Demarcus Tunstall, a motor transport operator assigned to I Marine Expeditionary Force Support Battalion, during convoy training at Marine Corps Base Camp Pendleton, January 16, 2019. **Top right:** Ice Camp Sargo, located in the Arctic Circle, serves as the main stage for Ice Exercise (ICEX) 2016, a five-week exercise designed to research, test, and evaluate operational capabilities in the region. ICEX 2016 allows the U.S. Navy and Marine Corps to assess operational readiness in the Arctic, increase experience in the region, advance understanding of the Arctic environment, and strengthen strategic partnerships, March 13, 2016. **Middle left:** Firefighters with the Camp Pendleton Fire Department combat a fire in the Santa Margarita/De Luz Housing area on Marine Corps Base Camp Pendleton, California, on July 6, 2018. **Middle right:** U.S. Marines help push a car out of a flooded area on Marine Corps Base Camp Lejeune, North Carolina during Hurricane Florence, Sept. 15, 2018. **Bottom:** Waves break over the Ticonderoga-class guided-missile cruiser USS Bunker Hill (CG 52) as the ship receives fuel from the Nimitz-class aircraft carrier USS Carl Vinson (CVN 70) during a refueling at sea, Dec 24, 2011.

Cover Left: The guided-missile destroyer USS Wayne E. Meyer (DDG 108) transits through a lightning storm in the South China Sea. Wayne E. Meyer is deployed to the U.S. 7th Fleet area of operations to support regional stability, reassure partners and allies, and maintain a presence postured to respond to any crisis ranging from humanitarian assistance to contingency operations, Oct 1, 2019. Cover Top Right: The national ensign flies above the Virginia-class fast attack submarine USS Illinois (SSN 786) during Ice Exercise (ICEX) 2022. ICEX 2022 is a three-week exercise that allows the Navy to assess its operational readiness in the Arctic, increase experience in the region, advance understanding of the Arctic environment, and continue to develop relationships with other services, allies, and partner organizations, March 6, 2022. Cover Center Right: Soldiers assigned to the 10th Mountain Division stand security at Hamid Karzai International Airport, Kabul, Afghanistan. Soldiers and Marines are supporting the orderly drawdown of designated personnel in Afghanistan, Aug.15, 2021. Cover bottom right: Sailors participate in a search and rescue swimmer exercise in the Persian Gulf, Feb. 23, 2020.

FORWARD

Climate change is one of the most destabilizing forces of our time, exacerbating other national security concerns and posing serious readiness challenges. Our naval forces, the United States Navy and Marine Corps, are in the crosshairs of the climate crisis: the threat increases instability and demands on our forces while simultaneously impacting our capacity to respond to those demands.

It is because of this direct threat to mission that I chose climate as a focal point for my tenure as Secretary. While this reality is one that the Department of Navy (DON) has faced for some time, it is a reality that we face with new urgency and resolve.

On January 27, 2021, as one of his first acts, President Biden prioritized climate change as an essential element of national security in Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*. Secretary Austin has championed that prioritization in the Department of Defense. Partners and allies around the globe, the economy, and the security ecosystem are similarly focused and committed.

For the Department of Navy, this is existential. If we do not act, as sea levels rise, bases like Norfolk Naval Base and Marine Corps Recruit Depot Parris Island will be severely tested in their ability to support their missions. If temperatures continue to rise, the oceans will get warmer, creating more destructive storms requiring our Fleets and Marine Corps forces to increase their operational tempo to respond.

We will see more extreme heat events such as the record-setting heatwaves in the normally temperate Pacific Northwest, and the expansive fires and unprecedented droughts in the West. These events mean more black flag days with temperatures at-or-above 90 degrees Fahrenheit, requiring strenuous activity – including mission-essential training – be curtailed because it is not safe. It means strain on the grid as people compete for energy to cool off, making mission and our people vulnerable to an outage.

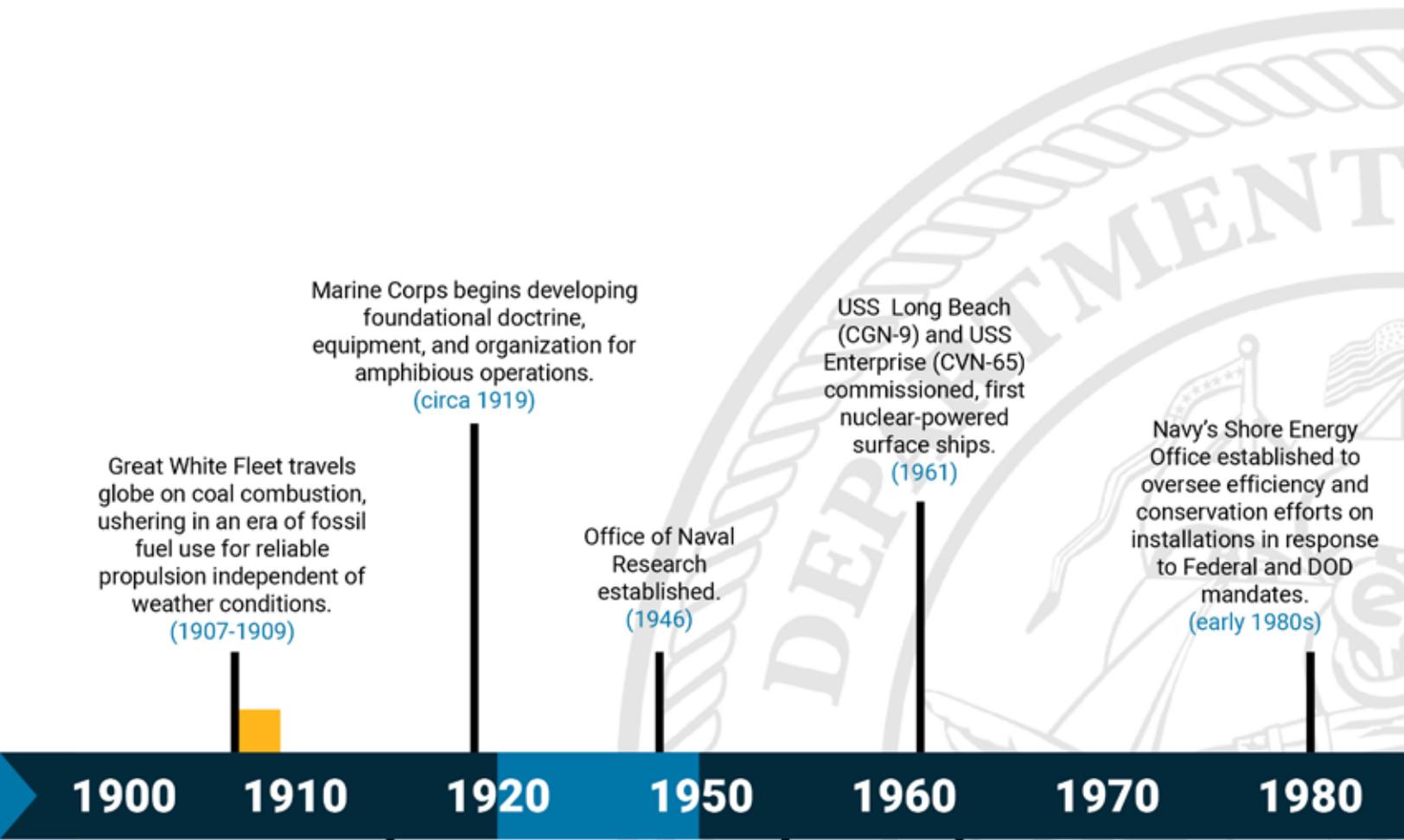
If temperatures continue to rise, and disease develops and spreads, our hospital ships and medical personnel will be called on to deploy more in support of nations in need. As we see increased instability in parts of the world strained by climate-driven water and food insecurity or migration, the blue-green Gator Navy team will need to support more of these increasing humanitarian aid and disaster relief missions.

For these reasons and so many others integral to our mission, the Department of Navy will take on the urgency of the climate crisis and harness our power to make change – as an environmental leader and a market driver. For the DON, bold climate action is a mission imperative. In this decisive decade, we have no other alternative.

As a complementary document to this strategy, I am issuing to the Department of the Navy implementation guidance for climate action, directing the development of plans of action and milestones outlining how we will achieve the goals set forward here. My lead for this effort will be the Assistant Secretary of the Navy for Energy, Installations, and Environment. It is my experience that every individual, command, and component will take an active role and clear responsibility for integrating climate action into every aspect of the Department of Navy mission.



Carlos Del Toro
Secretary of the Navy

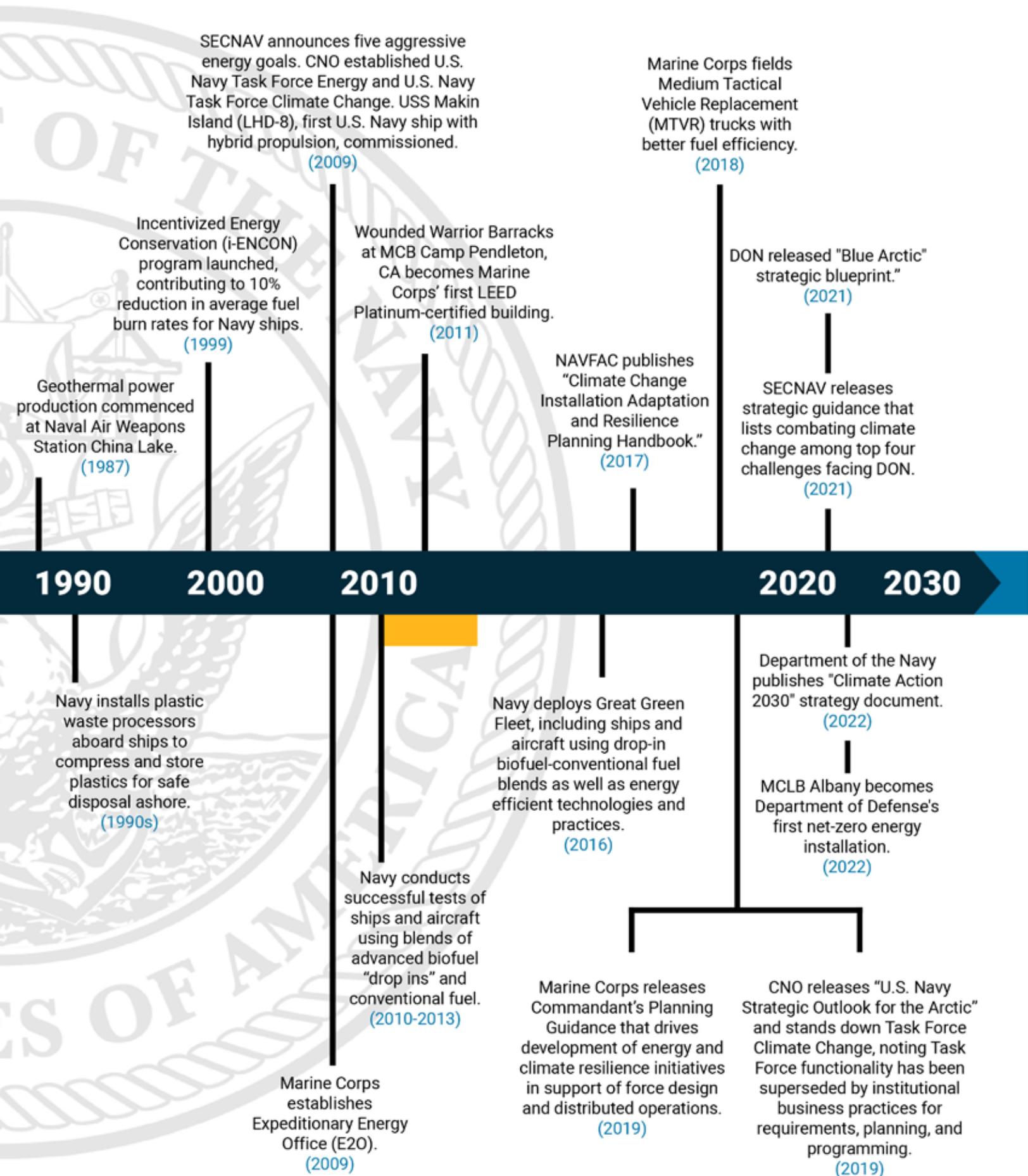


Navy commissions USS Nevada and USS Oklahoma, first two warships equipped with oil-fired boilers. (1916)

Navy commissions USS Nautilus, world's first nuclear-powered submarine. (1954)

Naval Oceanographic Office established in recognition of the growing importance of oceanographic science to submarine warfare. (1962)

Department of the Navy **CLIMATE ACTION 2030**



DEFINITIONS

Adaptation: adjustment in natural or human systems in anticipation of or response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative efforts. *Source: DoD Directive 4715.21, Climate Change Adaptation and Resilience*

Carbon Sequestration: the process of capturing and storing atmospheric carbon dioxide. *Source: U.S. Geological Survey*

Climate Change: variations in average weather conditions that persist over multiple decades or longer that encompass increases and decreases in temperature, shifts in precipitation, and changing risk of certain types of severe weather events. *Source: Office of the Chairman of the Joint Chiefs of Staff, DoD Dictionary of Military and Associated Terms*

CO2 Equivalent (CO2e): the number of metric tons of carbon dioxide emissions with the same global warming potential as one metric ton of another greenhouse gas. *Source: U.S. Environmental Protection Agency*

Environmental Justice: the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. *Source: U.S. Environmental Protection Agency*

Global Warming Potential (GWP): a measure of how much energy the emissions of one ton of a gas will absorb over a given period, relative to the emissions of one ton of carbon dioxide. GWP is used to convert any greenhouse gas emissions to their CO2e. *Source: U.S. Environmental Protection Agency*

Greenhouse Gases: gases in the Earth's atmosphere that trap heat. Rising levels of greenhouse gases during the industrial era have contributed to an increase in global average temperatures. *Source: Intergovernmental Panel on Climate Change Data Distribution Centre*

Mitigation: measures to reduce the amount and speed of future climate change by reducing emissions of heat-trapping gases or removing carbon dioxide from the atmosphere. *Source: DoD Climate Adaptation Plan and U.S. Global Change Research Program*

Natural Infrastructure: naturally occurring landscape features and/or nature-based solutions that promote, use, restore or emulate natural ecological processes. *Source: Environmental Defense Fund*

Net-Zero Emissions: negating the amount of greenhouse gases produced by human activity by reducing emissions and implementing methods of absorbing carbon dioxide from the atmosphere. This removal of greenhouse gases could be done through land or natural resource management, and human pollution intervention. *Source: Intergovernmental Panel on Climate Change*

Resilience: the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions. *Source: Office of the Chairman of the Joint Chiefs of Staff, DoD Dictionary of Military and Associated Terms*

OVERVIEW

Climate change is an existential threat that impacts not only our operations and readiness but also our infrastructure, our forces, and their families. Rising sea levels, recurring flooding, and more frequent and destructive hurricanes threaten our coastal installations. Changes in global climate and other dangerous trans-boundary threats, including pandemics, are only expected to worsen, posing increasing challenges for our forces, platforms, infrastructure, and supporting communities, and driving or intensifying conflict and humanitarian disasters around the world. The DON will adapt to these challenges that are increasingly putting pressure on our force and the systems that support it.

To combat these impacts, the Department of the Navy has an urgent charge: **to build a climate-ready force.**

To achieve this, the DON must meet two Performance Goals:

1. **Build Climate Resilience.** Ensure that our forces, systems, and facilities can continue to operate effectively and achieve the mission in the face of changing climate conditions, and worsening climate impacts.
2. **Reduce Climate Threat.** The Department must reduce its greenhouse gas emissions and draw greenhouse gases out of the atmosphere, stabilize ecosystems, and achieve, as an enterprise, the nation's commitment of net-zero emissions by 2050.

The nation has committed to achieve net-zero emissions economy-wide by 2050. The President released several Executive Orders that reiterate this commitment and added specific targets that apply to the DON. In addition to these targets, and further objectives that will be established during implementation planning efforts, the DON commits to drawing down the equivalent of one million cars' worth of CO₂e by 2027 on DON-managed lands through nature-based solutions, and to install cyber-secure microgrids or comparable resilience technology to support all critical missions.

These performance goals are absolutely aligned with our mission. *The One Navy-Marine Corps Team Strategic Guidance* priorities of maintaining maritime dominance, empowering our people, and strengthening strategic partnerships will guide Department efforts around achieving these performance goals. Alignment with these priorities, as well as those laid out in the *Chief of Naval Operations' Navigation Plan*, and the *Commandant of the Marine Corps' Planning Guidance* will enhance the readiness and capabilities of the DON as a global maritime power.

The Department will organize climate action around five Lines of Effort (LOE), consistent with those laid out in the Department of Defense's (DoD) Climate Adaptation Plan: climate-informed decision making; training and equipping for climate resilience; resilient built and natural infrastructure; supply chain resilience and innovation; and enhanced mitigation and adaptation through collaboration. Our approach will be data-driven, grounded in science, and focused on enhancing mission accomplishment.

BUILDING ON A STRONG FOUNDATION

The United States is a maritime nation, and the Department of the Navy (DON) works with allies and partners to defend freedom, preserve economic prosperity, and keep the seas open and free. The climate crisis directly threatens the ability of the Navy and Marine Corps to execute those missions.

The coming decades will witness climate change that could challenge the DON's global strategic laydown and operations. Climate change will drive more severe and more frequent weather events that will stress our systems and platforms, and threaten our installations. Melting Arctic ice will yield more access to resources and navigable sea routes, enabling greater transit of military and commercial vessels alike. Considering these factors and more, the Department has an urgent charge: **to build a climate-ready force.**

A climate-ready force is one that can fight and win around the globe, while anticipating, preparing for, recovering from, and adapting to the evolving climate and security future. It is a force that is manned, trained, and equipped to operate in anticipated future climate conditions, prepared to respond to climate-induced or intensified conflicts and humanitarian disasters. It is a force that makes climate-smart investments, acquisitions, and strategic partnerships. It is a force with resilient installations and infrastructure enabling these missions. It is a force that is knowledgeable about climate impacts, associated mission implications and solution sets, and that

Hurricane Sally brought historic amounts of rain, significantly damaging over 600 facilities on Naval Air Station Pensacola, FL. Navy Region Southeast deferred \$49M in FY2020/2021 sustainment and modernization requirements to fund initial response and repairs to withstand future storms, Sept. 16, 2020.





An aerial photograph showing flooding at Naval Support Activity Mid-South in Millington, TN. Two days of rain dumped more than 14 inches in the area, causing a levee to fail and flooding the base and surrounding community. The flood displaced military families from their homes, caused extensive damage to base auxiliary buildings, impacted critical IT systems, and cost the Navy approximately \$154M, May 2, 2010.

accounts for these considerations in decision-making. And it is a force that does its part to combat the climate threat by reducing its greenhouse gas emissions, and sequestering carbon in terrestrial and coastal ecosystems, leveraging built and natural infrastructure to enhance resilience.

Remaining the world's preeminent naval power while building a climate-ready force is a national security and warfighting imperative: climate success is mission success. We will proactively address the impacts of climate change to make our forces more capable, our systems and installations more resilient, and improve the health, safety, and quality of life of the force.

The climate crisis crosses sectors and geographies, and when we act together, we build more meaningful solutions and strengthen our collective security. The DON will work with a full range of partners from allied nations and international security organizations, to cities, counties, states, and tribes, our sister services, other federal agencies, and the private sector.

Some of the targets we are aiming for in this strategy extend beyond 2030. We are setting this strategic vision from now until 2030 because the scientific community has been clear that this is the decisive decade in which the world must make meaningful progress if we are to avoid the most catastrophic impacts of climate change.



An electric van docks at a new solar-powered electric vehicle charging station on Marine Corps Base Camp Pendleton, CA. The self-contained, portable charging stations are independent from the electric grid, can be installed immediately, fit over a parking spot, and be moved to support mission essential tasks or be used during emergencies as a power bank, increasing overall mission resilience for U.S. forces. The Marine Corps' Southwest Region Fleet Transportation Office recently acquired two of these charging stations to add to their existing permanent electric vehicle charging infrastructure at Camp Pendleton, Jan. 12, 2022.

The Department has a long history that establishes a foundation to succeed against this challenge. Transitioning to cleaner forms of energy is one of the central ways that nations can limit the adverse impacts of climate change; the DON has repeatedly managed energy transitions well. Ship's power evolved from wind to coal, to fossil fuels, to – in some cases – nuclear power, each time combining innovation with efficiency to meet mission requirements.

Over the last decade, the Department has successfully employed propulsion efficiencies and hybridization as well as low carbon fuels, partnering with the Departments of Energy and Agriculture. These innovations expand the strategic availability of fuel to the force while yielding climate benefits.

The Department has established ambitious energy goals and made significant progress towards those goals. The DON's energy consumption has been falling since 2008, and the Department has delivered an additional gigawatt of renewable energy to the commercial grid since 2012.

A wide array of partnerships has been instrumental to the Department's successes in increasing energy resilience, reliability, and efficiency, as well as reducing energy consumption. The Department of Energy has been a major partner, providing science and technology, technical expertise, and acquisition capabilities that enable third-party financing of Energy Savings Performance Contracts and Utility Energy Service Contracts.

The DON has awarded over \$3 billion in these contracts, which are reducing energy consumption, greenhouse gas emissions, and increasing energy and water resilience at installations across the United States and overseas.

Installation resilience does not stop at the fence line, and partnerships with states and local communities have been pivotal to increasing resilience. The Department has renewed a memorandum of understanding with the California Energy Commission that will help the Navy, Marine Corps, and the state collaborate on energy and water resilience, greenhouse gas reductions, and alternative-fuel vehicles.

The DON is also leading research on advanced batteries, catalyzing the Federal Consortium for Advanced Batteries in partnership with the Departments of State, Energy, Commerce, and others. Working with DoD, other federal agencies, and industry, the DON is advancing battery technology and safety, and ensuring a domestic supply of lithium batteries needed for mission functions as well as our nation's industrial base.

The Marine Corps has upgraded one-third of its fleet of Medium Tactical Vehicle Replacement (MTVR) seven-ton trucks to a more fuel-efficient version and expects the remainder to be upgraded by 2024. At bases and installations around the world, the DON has installed advanced meters to track energy usage and to drive a culture of energy efficiency. Pursuant to 10 U.S.C. 2912, the Department has

A Medium Tactical Vehicle Replacement (MTVR) drives off a landing craft during Exercise Cobra Gold, an annual multinational exercise to promote interoperability and training between the U.S. and Thailand. The Marine Corps has upgraded 1/3 of its MTVRs to a higher fuel efficiency engine, which increases mission capability while reducing emissions, Feb. 12, 2014.





An SH-60S Sea Hawk helicopter, assigned to Helicopter Sea Combat Squadron (HSC) 26, flies during degraded visual environment training near Udari Army Air Field in Kuwait. HSC-26, is a Forward Deployed Naval Force (FDNF) asset attached to Commander, Task Force (CTF) 53 to provide combat logistics and search and rescue capability throughout the U.S. 5th Fleet area of operations, Aug. 19, 2015.

recovered \$155 million based on its reduced energy consumption. For savings generated by installations, half of these funds are reinvested into energy conservation, energy resilience and similar programs, while the remaining 50% go back to the installations that generated the savings to fund projects such as morale, welfare and recreation facilities and services. Savings recovered from operational energy activities are reinvested in energy innovation technologies and fuel savings initiatives to enhance mission capabilities and quality of life.

The Department, as a global leader in science and technology, has committed its scientists and researchers to collaborate with colleagues around the world to advance climate data, improve resilience, and bring about transformational low-carbon technologies. The Department is also leading at the nexus of public health and climate. Public health experts have been conducting health surveillance, research, and modeling to better understand how disease vectors and health outcomes are changing with the climate. For example, the Navy and Marine Corps Public Health Center and Navy Entomology Center of Excellence are building global partnerships with governments, militaries, academic institutions, and commercial and private stakeholders from around the world to share training and expertise. These partnerships combat the climate-driven spread of disease and insecticide resistance in nations that suffer disproportionately from climate health threats.

The DON has also been a leader in planning for climate change impacts on its built and natural infrastructure through the development of tools like the *Navy's Climate Change Planning Handbook: Installation Adaptation and Resilience*. Working with federal, state, local, and private sector partners, the DON has implemented nature-based climate solutions like restoring wetlands and coastal ecosystems to protect installations and neighboring defense communities from erosion, storm surge, and sea-level rise.

The DON is also building resilience and sequestering carbon through regenerative land management techniques. For example, Naval Air Station Patuxent River stopped mowing the grass on much of the base, allowing it to return to natural forest, saving the base over \$400K annually on grounds maintenance, sequestering carbon dioxide, reducing emissions from mowing equipment, and improving species habitat, stormwater runoff, and quality of life for base employees. Keeping the grass near the airfield taller also reduced bird strike risk, a significant mission benefit.

U.S. Marine Corps Lance Cpl. Jose Martinez Lopez, right, and Lance Cpl. Jerry Garcia Villegas, center, both water support technicians with Combat Logistics Battalion 7, Marine Rotational Force – Darwin (MRF-D), and Australian Army Craftsman Benjamin Flavell, left, set-up a water purification point during exercise Crocodile Response at Point Fawcett, NT, Australia. Exercise Crocodile Response tested the ability of MRF-D and the Australian Defence Force to provide disaster relief in the Indo-Pacific region, May 25, 2021.





Volunteers from Naval Support Activity Hampton Roads, VA, Naval Facilities Engineering Systems Command Atlantic, military families, and volunteers from local conservation groups, participate in an oyster castle installation event at the Lafayette River Annex, Jul. 16 and 17, 2020.

The Department has harnessed the proven value of natural infrastructure in bolstering resilience. Naval Weapons Station Yorktown is bounded and protected by a critical fringe of shoreline, wetlands, and piers, which are all degrading significantly, threatening installation operations and increasing maintenance demands. The base received \$2 million in DoD funds and worked collaboratively with the Virginia Institute of Marine Science and other partners to leverage over \$10 million in partner contributions to build living shoreline oyster reefs benefiting the ecological functions of the York River while also enhancing the base's resilience and force protection.

At Marine Corps Base Camp Lejeune, the DON partnered with the National Oceanographic and Atmospheric Administration to research wetlands and the potential for carbon sequestration in these ecosystems, and built resilience by stabilizing shorelines and restoring salt marshes. Several southeastern coastal installations are engaged in a regional-scale effort called the South Atlantic Salt Marsh Initiative, which claims to conserve one million acres of salt marsh for coastal resilience from Florida to North Carolina.

GOALS AND TARGETS

It is with this history and standing on this strong foundation that the Department moves forward.

Performance Goals

To achieve a climate-ready force, the DON must realize two Performance Goals:

1. **Build Climate Resilience.** Ensure that our forces, systems, and facilities can continue to operate effectively and achieve the mission in the face of changing climate conditions, and worsening climate impacts.
2. **Reduce Climate Threat.** The Department must do its part to reduce greenhouse gas emissions and draw greenhouse gases out of the atmosphere to stabilize ecosystems, and achieve, as an enterprise, the President's commitment of net-zero emissions by 2050, as well as other targets.

Specific Targets

The nation has committed to achieve net-zero emissions economy-wide by 2050. Executive Order (EO) 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, reiterated this commitment and added several other specific targets that apply to the DON. The DON will develop plans and initiatives to begin making progress towards implementing all applicable provisions in EO 14057, including:

- Achieving a 65 percent reduction in scope 1 and 2 greenhouse gas emissions department-wide by 2030 (measured from a 2008 baseline)
- Achieving 100 percent carbon pollution-free electricity (CFE) by 2030, at least half of which will be locally supplied clean energy to meet 24/7 demand
- Acquiring 100 percent zero-emission vehicles by 2035, including 100 percent zero-emission light-duty vehicle acquisitions by 2027
- Achieving a 50 percent reduction in emissions from buildings by 2032
- Annually diverting at least 50 percent of non-hazardous solid waste from landfills, including food and compostable materials, and construction and demolition waste and debris by 2025

In addition to the EO targets, and further objectives that will be established during implementation planning efforts, the DON commits to achieving the following:

- **Nature-Based Resilience.** Building on Executive Order 14072, Strengthening the Nation's Forests, Communities and Local Economies, the DON will draw down an additional five million metric tons of CO₂e per year through nature-based solutions by 2027, roughly the same as removing one million cars off the road, on DON-managed lands or working with partners. The DON will also deploy nature-based solutions to mitigate shoreline erosion, protect mission-critical assets, and improve natural assets that are key to achieving resilient infrastructure and operations.
- **Energy Resilience.** The DON will ensure energy resilience for mission accomplishment by deploying cyber-secure microgrids or comparable resilience technologies to support its most critical missions. These installation microgrids will leverage carbon pollution-free power generation and long-duration battery storage to the greatest extent practicable for continuity of operations for critical missions.

These targets are ambitious, transformational, and only the beginning of what is required. Every part of the organization will have a role to play in making progress towards these targets and the two performance goals needed to achieve a climate-ready force.

The advanced microgrid installation at Marine Corps Air Station Miramar, CA. was completed in March 2021, making the air station one of the most energy-forward defense installations in the nation. The microgrid incorporates power from solar panels, biogas from a nearby landfill, and use other energy-efficient systems. This installation is part of the U.S. Marine Corps' efforts to expand energy resilience and independence, and reduce emissions, Nov. 1, 2016.



WAY FORWARD

Climate change is transforming the context in which the DON operates, and increasingly putting pressure on our force, defense communities, and the systems that support them. The Department's climate efforts will focus on both adapting to changing climate conditions and mitigating climate impacts. The DON will continue and accelerate efforts to build resilience, reduce emissions, and place a new focus on drawing carbon dioxide out of the atmosphere. Goals and gap-closure plans will be data-driven, transparent, grounded in data analytics, and focus on enhancing mission accomplishment. Consistent with the Secretary of the Navy's One Navy-Marine Corps Team Strategic Guidance, the Department will pursue climate change efforts that:

Strengthen maritime dominance. The Navy-Marine Corps team is charged with maintaining maritime dominance in defense of our nation. The Department does not have to choose between warfighting and preparing for climate change; the two go hand-in-hand. Doing our part to reduce the destabilizing threat of climate change and to ensure our ability to operate in an increasingly unstable future is an integral part of our mission and will make us a more capable, agile, and lethal fighting force. Climate solutions can reduce our force's vulnerability, enhance freedom of maneuver, and reduce logistical constraints all while reducing emissions, increasing community, physical, and mental health, improving natural habitats, and saving money. The Department will think holistically to maximize overall value and seek out these multiple wins.

Empower our people. Leadership, innovation, and ingenuity are the bedrock of Navy and Marine Corps culture. The Navy and Marine Corps have a deep tradition of navigating transformation, overcoming obstacles, and accomplishing the mission no matter how challenging; climate change is no different. From our Sailors and Marines and our civilian workforce, to the Department's facilities, educational institutions, cutting-edge research and development capabilities, global alliances, purchasing power, and natural resources, the DON has a breadth and depth of capabilities that is awe-inspiring. The Department will leverage and empower each of these to build a more capable force while addressing the climate challenge.

Strengthen strategic partnerships. The Department will take every opportunity to work across disciplines, and to reach outside the life-lines to collaborate with our sister services, international partners, other federal agencies, states, tribes, municipalities, non-governmental organizations, academia, the private sector, and all relevant stakeholders. In so doing, the Department can leverage other sources of funding, expertise, capabilities and develop more creative, meaningful, and impactful solutions. The Department will also prioritize environmental justice and ensure that our efforts emphasize community engagement, particularly with disadvantaged communities.

LINES OF EFFORT

The Department's efforts will be organized around and consistent with the five lines of effort (LOEs) in the DoD Climate Adaptation Plan:

LOE 1: Climate-informed decision-making.

Decision-making processes across the enterprise will consider climate change impacts, risks, and opportunities for adaptation, mitigation, and resilience benefits.

As the climate crisis accelerates, our operations, installations, and defense communities will come under increasing strain, and the individual resilience of Sailors, Marines, our Civilians, and defense families will also be tested. The Department will pursue initiatives to support the physical and mental resilience of our total force, alongside initiatives for the resilience of our platforms and physical infrastructure.

The DON will integrate climate change considerations and track climate investments throughout the planning, programming, budget justification, and ranking processes. Climate change impacts and threats will also be folded into wargames and training exercises. Climate change data will be embedded into the Department's performance management

Japan Maritime Self-Defense Force (JMSDF) Kongo-class guided-missile destroyer JS Kirishima (DDG 174), USS Stockdale (DDG 106), and JMSDF Takanami-class destroyer JS Onami (DD 111) sail in formation during Annual Exercise (ANNUALEX) 2021. Japan is among U.S. partner nations most affected by climate change and is collaborating with the U.S. Navy on strategic approaches for integrated logistics to address humanitarian assistance, disaster relief, and other peacetime operations, Nov. 21, 2021.





An Aerographer's Mate aboard USS Kearsarge (LHD 3) takes wind and environmental readings at sea. More frequent and intense extreme weather events exacerbated by climate change have the long-term potential to undermine training capability and readiness, Aug. 11, 2021.

capabilities to support leadership in understanding progress and risks towards accomplishing defined climate-related outcomes. The Department will develop and execute an analytic agenda to fill data, science, and technology gaps in our understanding of climate impacts to ensure that we identify emerging vulnerabilities and opportunities for future solution sets. The Department will also incorporate meaningful climate related training and education curricula tied to mission objectives into the continuum of learning for the entire force, from enlisted personnel to senior officers and civilians.

Integrating Climate Considerations into the Budget Process.

The Department identified climate investments as specific line items within its annual budget for the first time in 2021, looking at areas such as adaptation and resilience, exercises and assessments, disaster response, modeling and sensing, and future planning. These investments support the warfighter and align with mission priorities. The DON has prioritized climate investments in the budget review and approval process, including a team dedicated to assessing and prioritizing additional climate change investments. The DON is working with the Office of the Secretary of Defense to refine and standardize this analysis and guidance for climate investments in future budget submissions.

LOE 2: Train and equip for climate resilience.

The Department will ensure that the total force is trained and equipped to operate effectively and efficiently in evolving and intensifying climate conditions.

Energy usage by the DON's operational platforms (primarily ships and aircraft) accounts for the bulk of the Department's emissions. These platforms are also widely recognized as being the hardest to decarbonize based on the missions they must perform, the amount of energy they require, and the long service life of these capital assets. Enabling mission success will always be the Department's primary concern, and the climate solutions we build will make the force more formidable in a contested logistics and increasingly distributed operating environment.

Consistent with that mission focus, the DON will address its operational emissions, supporting a Department-wide pathway to net-zero by 2050, focusing on initiatives that both increase capability and decrease emissions. Specific focus areas will be identification and implementation of energy efficiency, demand reduction, and operational improvements; analysis of the impact of future force structure growth, asset mix, and fuel types to support future warfighting requirements; and engagement with industry and other partners to ensure that all relevant technologies,

Navy Petty Officer 2nd Class Victoria Witherspoon serves as a ground guide to a Navy dump operator as they assist with road clearing operations during Hurricane Ida disaster relief efforts in Grand Isle, LA, Sept. 16, 2021.



partnerships and contractual structures are rigorously evaluated against the dual goals of combat capability and energy transition.

Electrification of Tactical Ground Vehicles. Hybridization and electrification of tactical ground vehicles used in combat yield climate and mission benefits through reduced fuel consumption, increased operational reach, and enhanced on-board capabilities. Critical drivers for hybridization and electrification of tactical vehicles are reduced logistics footprint, extended range and endurance, reduced detectability, enhanced platform mobility, improved on-board and export power capability, potential lifecycle cost savings, reduced maintenance requirements, and increased survivability. Consistent with mission requirements, the DON is developing specifications and strategy for transitioning enhanced tactical vehicles in a way that is forward-looking, coordinated across the Services, and considers key industry trends.

The DON will continue to optimize its force through hybridization, electrification, alternative lower-carbon fuels, and advanced propulsion solutions for both existing and future tactical platforms in all domains – sea, air, and ground. The DON will ensure that energy performance is formally evaluated and optimized for every weapons system in the acquisitions process. The Department will also investigate options that share power between tactical vehicles and ground generation systems to optimize fuel use in combat operations and reduce the footprint of tactical forces. In all of these efforts, the focus will remain on warfighting efficacy, including fuel demand reduction, extending platform range, and improving resilience and survivability.

Beyond energy, the DON will continue to consider and update climate data in operational planning, including weather and health surveillance, and mission assurance assessments. The Department will prepare for rapidly changing and deteriorating climate conditions in developing, acquiring, fielding, and sustaining equipment and services, and further integrate climate-induced threats into our training and exercises. We will begin to measure and evaluate carbon emissions of tactical systems at a platform level in the acquisition process and seek opportunities to reduce emissions where tactically and operationally feasible.

Integrated and Improved Propulsion for Navy Ships. As a Department, there are currently five classes of combatant ships and eight classes of logistics ships with varying degrees of improved propulsion and hybridization. The DON will continue to explore hybrid and advanced propulsion options for all ships including future frigates and destroyers, and other classes of ships. Improved propulsion and hybridization will provide significantly increased flexibility for future capability upgrades, enabling them to be integrated in a more cost-effective and timely manner and provide warfare commanders with increased operational flexibility while decreasing demand on the Combat Logistics Fleet.

LOE 3: Resilient built and natural infrastructure.

Built and natural infrastructure will be resilient to projected climate impacts and continue to support mission requirements, military readiness, and operational success.

The Department will unlock the full mission and resilience value of all its built and natural assets. Dealing with the impacts of water, whether too much or too little, is a central challenge of climate change. The Department will undertake large-scale ecosystem restoration efforts to improve the ability of Department-managed lands and coastlines to face the full range of water-related climate challenges from drought, water insecurity, and wildfire, to erosion, storm surge and sea-level rise. The DON will expand the use of natural infrastructure to build resilience, sequester carbon, and achieve local, landscape, and regional-scale climate solutions.

The Department will continue to work extensively with the DoD Readiness and Environmental Protection Integration (REPI) program which makes installations more resilient to climate change and other encroachment challenges through partnerships. The DON has used this program to collaborate with partners on over 800 conservation and restoration projects, resulting in an additional 230,000 acres of protected land yielding resilience benefits.

Coastal ecosystems are some of the most productive, and also some of the most threatened by climate change. Over 80 percent of the global carbon cycle is circulated through the ocean, and coastal habitats cover less than 2 percent of total ocean area, but they account for half of the total carbon sequestered in oceans. In addition to sequestering carbon, algae, seagrasses, mangroves, and salt marshes provide critical resilience for shoreline environments. Consistent with Executive Order 14072, Strengthening the Nation's Forests, Communities and Local Economies, the DON will expand its efforts to protect and restore blue carbon ecosystems on installations and in neighboring defense communities.

Naval Weapons Station Earle, New Jersey, Natural Infrastructure Resilience. Hurricane Sandy caused \$50 million in damage to Naval Weapons Station Earle, a critical ammunition resupply asset for the Department. In 2020, the base combined \$1.9 million in DoD REPI funds with \$61 million from the local county and the state to pay for beach replenishment, a living shoreline which includes artificial oyster reefs and salt marsh restoration to protect from storm surge and improve wildfire management. The entire project benefits six DoD facilities across 1.6 million acres exemplifying how building resilience through partnerships is cost-effective, expands our impact, and strengthens our mission readiness.



A Sailor with Naval Mobile Construction Battalion 1 (NMCB1) installs a water wash valve atop a containerized living unit at Camp Lemonnier in Djibouti, Africa. NMCB1 installed the arrays to study how the impacts of wind and dust affect the arrays' effectiveness. Solar arrays reduce the base's electrical load and the amount of diesel fuel used to power generators, Sept. 12, 2012.

The DON will continue to leverage its robust mission assurance program to identify climate, energy, water, and control systems cybersecurity risks, and prioritize adaption and mitigation initiatives to address these risks. The Department will expand energy generation and water conservation efforts through third-party financing vehicles and public-private partnerships. The DON will deepen resilience efforts through initiatives like distributed generation, smart grid, microgrids, and control system cyber security, providing efficiency gains and reliable power to enable mission accomplishment during periods of grid instability, including generation to support tactical systems and requirements.

The DON will build on the successes of its microgrid program by incorporating a cyber-secure microgrid or comparable resilience technology to support all critical missions. This technology supports energy resilience by isolating critical missions from grid instabilities and outages whether they are natural or manmade, and can be strengthened through conducting Energy Resilience Readiness Exercises and "black starts" to test installation resilience and continuity of operations during power outages. The DON will tackle emerging electrification requirements holistically to develop scalable and cyber-secure solutions which can rapidly meet adapting mission requirements. The Department will

also proactively leverage public and private ventures and third party financing to reduce the greenhouse gas emissions of its non-tactical vehicle fleets and the emissions and traffic impacts of its commuting military, civilian, and contractor workforces.

Marine Corps Logistics Base Albany, Georgia, Net Zero Energy. MCLB Albany became the Department's first installation to generate more energy than it consumes by implementing a range of solutions with a variety of partners. The base partnered with the county to harness landfill gas to power portions of the base, took steam from a private industrial facility off-base to power other parts of the base, and used solar and geothermal power as well. The base also procured fully mobile, solar-powered charging stations. These stations provide rapidly deployable, transportable, off-grid, and resilient electric vehicle (EV) charging, accelerating the integration of EVs into the non-tactical vehicle fleet while contributing to battery storage and emergency power.

The Department will accelerate water and energy conservation measures in buildings and expand the use of low carbon building materials. The DON will continue to leverage opportunities to quantify energy savings and invest those dollars in resilience projects, mission assurance, and programs that benefit Sailors, Marines, and their families. The DON will also modernize the design and materials used in physical infrastructure to reduce damage caused by extreme weather, erosion, and other climate

Naval Base Ventura County (NBVC), CA. employees, contractors, and volunteers plant native salt marsh plants near a newly constructed tidal channel in the central portion of NBVC Point Mugu. Salt marsh plants reduce erosion from storms, provide habitat for birds, fish, and marine invertebrates, while also helping sequester carbon, April 2016.



threats. The DON is investing in updating and developing military design and construction tools, studies, criteria, and resilience project designs to reflect the interdependencies and impacts of climate change and increased cyber threats from broader electrification of the enterprise on facilities and supporting infrastructure. Over the past three years, the DON has updated criteria to reflect extreme weather events, including higher winds from hurricanes, increased seismic activities, storm surge, and flooding, and is now developing new criteria for implementing nature-based climate resilience measures.

Marine Corps Air Station Miramar, California, Energy Resilience Initiatives. Marine Corps Air Station Miramar partnered with the city of San Diego to use biogas generated from an on-base landfill as a renewable energy source, providing over three megawatts of energy to the installation, and reducing reliance on the city's electric grid by 45%, while reducing emissions. The base built an advanced microgrid which integrates power from the landfill and on-base solar power with a new power plant that enables installation-wide critical operations to run during a utility grid outage. Miramar will also be installing large-scale battery energy storage and load management strategies to increase resilience capabilities, all while increasing efficiency through upgrading HVAC systems, installing LED bulbs in street lighting, and converting cooling towers to use recycled water.

The BOLT Lifesaver energy device, pictured at U.S. Navy's Wave Energy Test Site in Kaneohe Bay, HI, has so far successfully supplied 900 hours of power stored in a battery bank to support unmanned, undersea vehicle recharge and mission resilience. BOLT is a first of its kind device that generates energy solely using wave generated power, without relying on batteries or the electrical grid support. Photo provided from testing Oct. 2018 – Mar. 2019.



LOE 4: Supply chain resilience and innovation.

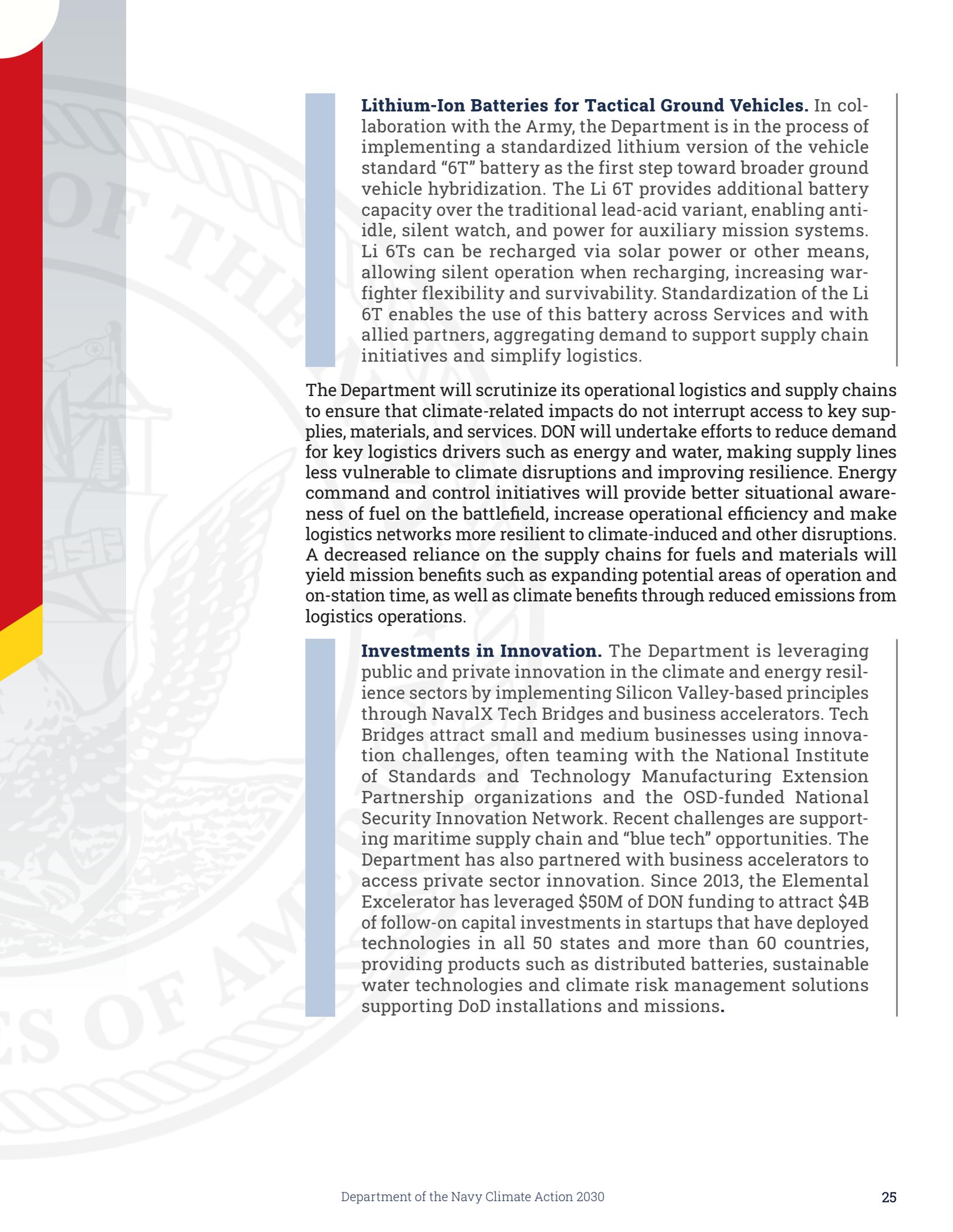
Through transformational low-carbon technologies and supply chain resilience measures, the DON will reduce demand on logistics drivers like energy and water, and ensure access to key materials, equipment, and supplies in the face of climate disruptions.

The DON will invest in areas such as transformational, low-carbon technologies and advanced energy storage and power generation solutions to support national security, warfighting advantage, and climate benefits. Through investments by the Office of the Naval Research (ONR) in advanced science and technology, the Department has growing innovation capabilities to better predict, mitigate and adapt to climate impacts. Some key ONR-supported research areas include oceanographic and meteorological modeling and prediction, efficient electrical power systems for ships, advanced water purification technologies and resilient cybersecure energy networks.

Low Carbon Fuels. In collaboration with the other Services and industry, the Department is in the process of qualifying low carbon tactical fuels currently developed and approved by the commercial sector. This is a critical step to position our forces to take the fullest advantage of low carbon fuels as they become available, assuring interoperability with the commercial sector, and maximizing worldwide supply chain resilience.

Amphibious assault ship USS America (LHA 6) was designed with a hybrid mechanical-electric propulsion system that can achieve greater range and/or more time on station compared to similar sized Navy ships that use steam propulsion, resulting in greater flexibility with regards to refueling and reduced maintenance costs, Nov. 18, 2016.





Lithium-Ion Batteries for Tactical Ground Vehicles. In collaboration with the Army, the Department is in the process of implementing a standardized lithium version of the vehicle standard “6T” battery as the first step toward broader ground vehicle hybridization. The Li 6T provides additional battery capacity over the traditional lead-acid variant, enabling anti-idle, silent watch, and power for auxiliary mission systems. Li 6Ts can be recharged via solar power or other means, allowing silent operation when recharging, increasing warfighter flexibility and survivability. Standardization of the Li 6T enables the use of this battery across Services and with allied partners, aggregating demand to support supply chain initiatives and simplify logistics.

The Department will scrutinize its operational logistics and supply chains to ensure that climate-related impacts do not interrupt access to key supplies, materials, and services. DON will undertake efforts to reduce demand for key logistics drivers such as energy and water, making supply lines less vulnerable to climate disruptions and improving resilience. Energy command and control initiatives will provide better situational awareness of fuel on the battlefield, increase operational efficiency and make logistics networks more resilient to climate-induced and other disruptions. A decreased reliance on the supply chains for fuels and materials will yield mission benefits such as expanding potential areas of operation and on-station time, as well as climate benefits through reduced emissions from logistics operations.

Investments in Innovation. The Department is leveraging public and private innovation in the climate and energy resilience sectors by implementing Silicon Valley-based principles through NavalX Tech Bridges and business accelerators. Tech Bridges attract small and medium businesses using innovation challenges, often teaming with the National Institute of Standards and Technology Manufacturing Extension Partnership organizations and the OSD-funded National Security Innovation Network. Recent challenges are supporting maritime supply chain and “blue tech” opportunities. The Department has also partnered with business accelerators to access private sector innovation. Since 2013, the Elemental Excelsior has leveraged \$50M of DON funding to attract \$4B of follow-on capital investments in startups that have deployed technologies in all 50 states and more than 60 countries, providing products such as distributed batteries, sustainable water technologies and climate risk management solutions supporting DoD installations and missions.

LOE 5: Enhance mitigation and adaptation through collaboration.

The DON will collaborate with external partners to combine capabilities, authorities, and funding, increasing the scale and scope of mitigation and adaptation efforts.

Through programs like the REPI Program, Sentinel Landscapes, the Defense Community Infrastructure Program, and other mechanisms, the DON will continue to work with defense communities, other federal agencies, non-governmental organizations, and a range of stakeholders to build adaptation and mitigation solutions at a local, landscape, or regional scale.

Mekong Delta Climate Research Collaboration. The Office of Naval Research collaborated with Vietnamese scientists to study Mekong Delta processes, developing a detailed understanding of climate-related phenomena like delta responses to rising sea levels, changes in mangrove environments, and reduced water flows from upstream. The US-Vietnam scientific collaboration was approved by the Vietnamese prime minister and initiated a continuing exchange of scientific ideas with this important partner.

The Department will also continue to work closely with science and technology partners on climate-related modeling, sensing, tracking, research, and assessments. The Department will work with allies and international partners, including security organizations and other stakeholders, to integrate climate into security cooperation and affirmatively build climate resilience in areas of the world that are most susceptible to climate-induced conflicts, humanitarian disasters, or acute climate impacts such as water and food insecurity or migration pressures.

California Organic Recycling and Composting. DON and the other military department are partnering with CalRecycle, local jurisdictions, industry, waste haulers and landfills to implement a California law that sets a state-wide target of reducing organic waste disposal by 75% by 2025. Composting greatly reduces the methane gas generated by organic waste, and methane is a powerful greenhouse gas (over thirty times as powerful as CO₂). Military installations across California are working closely with CalRecycle to implement organic waste diversion programs to achieve this target.

Worldwide Climate Health Partnerships. The Navy Entomology Center of Excellence partnered with Ghanaian Armed Forces, Police, and Ministry of Health to provide training and build local capacity to combat vector-borne diseases that are exacerbated by climate change, such as malaria. Through the partnership, Ghana is developing a comprehensive entomology research and control program, increasing the availability of mosquito surveillance equipment, and working to ensure the availability of diagnostic tests and medications so local communities can minimize malaria outbreaks and deployed military units remain combat effective.

Ghanaian Armed Forces receive a supply of mosquito surveillance and control equipment courtesy of the Navy Entomology Center of Excellence. Rising global temperatures result in a longer breeding season and broader geographic ranges for hosts of vector-borne diseases, like mosquitos, exacerbating a threat to the health of U.S. forces and our partners, Mar 12, 2020.



NEXT STEPS

There is no time to waste. Climate change is already impacting our Department, our Nation, and the world in significant ways, and the threat will only intensify in the coming decades. The DON has made meaningful progress, and now the magnitude and urgency of the climate crisis demand that the Department accelerate our efforts, work together, and think creatively to arrive at new and expanded solutions.

In tandem with this strategy document, the DON is initiating a 90-day implementation planning process guided by an implementation memorandum. During this timeframe, Navy and Marine Corps counterparts will work together to identify initiatives to make progress towards the performance goals outlined herein. The DON is also standing up an Executive Steering Committee, to be chaired by the Assistant Secretary of the Navy for Energy, Installations, and Environment, to ensure cohesive implementation of this strategy across the enterprise.

The Department's Climate Change Working Group will continue to meet regularly to drive and share best practices. Together, we will build upon progress and meet the moment to bolster our climate resilience, reduce our climate impacts, and remain the world's dominant maritime force.

The Nimitz-class aircraft carrier USS Theodore Roosevelt (CVN 71) transits the Gulf of Alaska after participating in Exercise Northern Edge 2019. Northern Edge is one in a series of U.S. Indo-Pacific Command exercises in 2019 that prepares joint forces to respond to crisis in the Indo-Pacific region, May 25, 2019





Top Left: Naval Air Station Sigonella Command Master Chief Anna Wood, right, and the watch commander, Chief Master-at-Arms Dimitris Mack, clear a drain of debris during the early hours of an expected storm hitting NAS Sigonella, Oct. 29, 2021. **Top Right:** NRL researchers monitor changing Arctic using sound First deployment of an earlier version of the Ice-tethered acoustic Buoy (ITAB), March 2017. **Middle Left:** Aircrewmembers assigned to the "Merlins" Helicopter Sea Combat Squadron (HSC) 3 help guide pilots as they fill a 360-gallon capacity precision helicopter firefighting Bambi bucket to help extinguish wildfires near Naval Base Ventura County (NBVC) Point Mugu's base housing, May 3, 2013. **Middle Right:** An Air-Deployable Expendable Ice Buoy (AXIB) is deployed in the high Arctic near the North Pole from a Royal Danish Air Force C-130 aircraft operating out of Thule Air Force Base in Greenland, as part of a conglomeration of global participants that maintain a network of drifting buoys in the Arctic Ocean that provide meteorological and oceanographic data for real-time operational requirements and research purposes, Sep. 7, 2017. **Bottom:** Explosive ordnance disposal technicians assigned to Explosive Ordnance Disposal Mobile Unit (EODMU) 5 help repair a damaged coral reef in Apra Harbor, Jun. 29, 2017.

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