



QUADRENNIAL DEFENSE REVIEW REPORT

FEBRUARY 2010



QDR

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February 2010

The global economy has changed, with many countries now possessing advanced research, development, and manufacturing capabilities. Moreover, many advanced technologies are no longer predominantly developed for military applications with eventual transition to commercial uses, but follow the exact opposite course. Yet, in the name of controlling the technologies used in the production of advanced conventional weapons, our system continues to place checks on many that are widely available and remains designed to control such items as if Cold War economic and military-to-commercial models continued to apply.

The U.S. export system itself poses a potential national security risk. Its structure is overly complicated, contains too many redundancies, and tries to protect too much. Today's export control system encourages foreign customers to seek foreign suppliers and U.S. companies to seek foreign partners not subject to U.S. export controls. Furthermore, the U.S. government is not adequately focused on protecting those key technologies and items that should be protected and ensuring that potential adversaries do not obtain technical data crucial for the production of sophisticated weapons systems.

These deficiencies can be solved only through fundamental reform. The President has therefore directed a comprehensive review tasked with identifying reforms to enhance U.S. national security, foreign policy, and economic security interests. Reform efforts must reflect an inherently interagency process as current export control authorities rest with other departments. Similarly, meaningful reforms will not be possible without congressional involvement throughout the process. The Department of Defense has a vital stake in fundamental reform of export controls, and will work with our interagency partners and Congress to ensure that a new system fully addresses the threats that the United States will face in the future.

Crafting a Strategic Approach to Climate and Energy

Climate change and energy are two key issues that will play a significant role in shaping the future security environment. Although they produce distinct types of challenges, climate change, energy security, and economic stability are inextricably linked. The actions that the Department takes now can prepare us to respond effectively to these challenges in the near term and in the future.

Climate change will affect DoD in two broad ways. First, climate change will shape the operating environment, roles, and missions that we undertake. The U.S. Global Change Research Program, composed of 13 federal agencies, reported in 2009 that climate-related changes are already being observed in every region of the world, including the United States and its coastal waters. Among these physical changes are increases in heavy downpours, rising temperature and sea level, rapidly retreating glaciers, thawing permafrost, lengthening growing seasons, lengthening ice-free seasons in the oceans and on lakes and rivers, earlier snowmelt, and alterations in river flows.

Assessments conducted by the intelligence community indicate that climate change could have significant geopolitical impacts around the world, contributing to poverty, environmental degradation, and the further weakening of fragile governments. Climate change will contribute to food and water scarcity, will increase the spread of disease, and may spur or exacerbate mass migration.

While climate change alone does not cause conflict, it may act as an accelerant of instability or conflict, placing a burden to respond on civilian institutions and militaries around the world. In addition, extreme weather events may lead to increased demands for defense support to civil authorities for humanitarian assistance or disaster response both within the United States and overseas. In some nations, the military is the only institution with the capacity to respond to a large-scale natural disaster. Proactive engagement with these countries can help build their capability to respond to such events. Working closely with relevant U.S. departments and agencies, DoD has undertaken environmental security cooperative initiatives with foreign militaries that represent a nonthreatening way of building trust, sharing best practices on installations management and operations, and developing response capacity.

Second, DoD will need to adjust to the impacts of climate change on our facilities and military capabilities. The Department already provides environmental stewardship at hundreds of DoD installations throughout the United States and around the world, working diligently to meet resource efficiency and sustainability goals as set by relevant laws and executive orders. Although the United States has significant capacity to adapt to climate change, it will pose challenges for civil society



At Fort Carson, Colo., the Army partnered with a local energy provider in an enhanced-use lease. The energy provider built a photovoltaic solar array on top of a closed landfill. That site now provides energy to some 540 homes. U.S. Army photo.

and DoD alike, particularly in light of the nation's extensive coastal infrastructure. In 2008, the National Intelligence Council judged that more than 30 U.S. military installations were already facing elevated levels of risk from rising sea levels. DoD's operational readiness hinges on continued access to land, air, and sea training and test space. Consequently, the Department must complete a comprehensive assessment of all installations to assess the potential impacts of climate change on its missions and adapt as required.

In this regard, DoD will work to foster efforts to assess, adapt to, and mitigate the impacts of climate change. Domestically, the Department will leverage the Strategic Environmental Research and Development Program, a joint effort among DoD, the Department of Energy, and the Environmental Protection Agency, to develop climate change assessment tools. Abroad, the Department will increase its investment in the Defense Environmental International Cooperation Program not only to promote cooperation on environmental security issues, but also to augment international adaptation efforts. The Department will also speed innovative energy and conservation technologies from laboratories to military end users. The Environmental Security and Technology Certification Program uses military installations as a test bed to demonstrate and create a market for innovative energy efficiency and renewable energy technologies coming out of the private sector and DoD and Department of Energy laboratories. Finally, the Department is improving small-scale energy efficiency and renewable energy projects at military installations through our Energy Conservation Investment Program.



Personnel from the University of Washington's Applied Physics Laboratory prepare to recover a torpedo from under the ice on March 20, 2009. DoD photo by Mass Communication Spec. First Class Tiffini M. Jones, U.S. Navy.

The effect of changing climate on the Department's operating environment is evident in the maritime commons of the Arctic. The opening of the Arctic waters in the decades ahead which will permit seasonal commerce and transit presents a unique opportunity to work collaboratively in multilateral forums to promote a balanced approach to improving human and environmental security in the region. In that effort, DoD must work with the Coast Guard and the Department of Homeland Security to address gaps in Arctic

communications, domain awareness, search and rescue, and environmental observation and forecasting capabilities to support both current and future planning and operations. To support cooperative engagement in the Arctic, DoD strongly supports accession to the United Nations Convention on the Law of the Sea.

As climate science advances, the Department will regularly reevaluate climate change risks and opportunities in order to develop policies and plans to manage its effects on the Department's operating environment, missions, and facilities. Managing the national security effects of climate

change will require DoD to work collaboratively, through a whole-of-government approach, with both traditional allies and new partners.

Energy security for the Department means having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet operational needs. Energy efficiency can serve as a force multiplier, because it increases the range and endurance of forces in the field and can reduce the number of combat forces diverted to protect energy supply lines, which are vulnerable to both asymmetric and conventional attacks and disruptions. DoD must incorporate geostrategic and operational energy considerations into force planning, requirements development, and acquisition processes. To address these challenges, DoD will fully implement the statutory requirement for the energy efficiency Key Performance Parameter and fully burdened cost of fuel set forth in the 2009 National Defense Authorization Act. The Department will also investigate alternative concepts for improving operational energy use, including the creation of an innovation fund administered by the new Director of Operational Energy to enable components to compete for funding on projects that advance integrated energy solutions.

The Department is increasing its use of renewable energy supplies and reducing energy demand to improve operational effectiveness, reduce greenhouse gas emissions in support of U.S. climate change initiatives, and protect the Department from energy price fluctuations. The Military Departments have invested in noncarbon power sources such as solar, wind, geothermal, and biomass energy at domestic installations and in vehicles powered by alternative fuels, including hybrid power, electricity, hydrogen, and compressed natural gas. Solving military challenges—through such innovations as more efficient generators, better batteries, lighter materials, and tactically deployed energy sources—has the potential to yield spin-off technologies that benefit the civilian community as well. DoD will partner with academia, other U.S. agencies, and international partners to research, develop, test, and evaluate new sustainable energy technologies.

Indeed, the following examples demonstrate the broad range of Service energy innovations. By 2016, the Air Force will be postured to cost-competitively acquire 50 percent of its domestic aviation fuel via an alternative fuel blend that is greener than conventional petroleum fuel. Further, Air Force testing and standard-setting in this arena paves the way for the much larger commercial aviation sector to follow. The Army is in the midst of a significant transformation of its fleet of 70,000 non-tactical vehicles (NTVs), including the current deployment of more than 500 hybrids and the acquisition of 4,000 low-speed electric vehicles at domestic installations to help cut fossil fuel usage. The Army is also exploring ways to exploit the opportunities for renewable power generation to support operational needs: for instance, the Rucksack Enhanced Portable Power System (REPPS). The Navy commissioned the USS *Makin Island*, its first electric-drive surface combatant, and tested an F/A-18 engine on camelina-based

biofuel in 2009—two key steps toward the vision of deploying a “green” carrier strike group using biofuel and nuclear power by 2016. The Marine Corps has created an Expeditionary Energy Office to address operational energy risk, and its Energy Assessment Team has identified ways to achieve efficiencies in today’s highly energy-intensive operations in Afghanistan and Iraq in order to reduce logistics and related force protection requirements.

To address energy security while simultaneously enhancing mission assurance at domestic facilities, the Department is focusing on making them more resilient. U.S. forces at home and abroad rely on support from installations in the United States. DoD will conduct a coordinated energy assessment, prioritize critical assets, and promote investments in energy efficiency to ensure that critical installations are adequately prepared for prolonged outages caused by natural disasters, accidents, or attacks. At the same time, the Department will also take steps to balance energy production and transmission with the requirement to preserve the test and training ranges and the operating areas that are needed to maintain readiness.