



DEPARTMENT OF HOMELAND SECURITY

# CLIMATE CHANGE ADAPTATION ROADMAP

JUNE 2012



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I am pleased to approve and publish the Department of Homeland Security (DHS) Climate Change Adaptation (CCA) Roadmap. The DHS CCA Roadmap fulfills the requirement of Executive Order (EO) 13514, *Federal Leadership in Environmental, Energy and Economic Performance* (October 2009), for all Federal Departments and Agencies to reinforce and comply with the U.S. Government's efforts to develop a national climate change adaptation strategy. The CCA Roadmap is the Department's supporting adaptation plan and represents the culmination of the Department's Fiscal Year (FY) 2011 climate change adaptation efforts.

Just as we plan for future contingencies and risks of all kinds to homeland security, DHS is working to understand the potential impacts of climate change across all of our homeland security missions. Led by the DHS Climate Change Adaptation Executive Steering Committee, the Department has taken key steps to integrate climate change adaptation into the Department's business

processes. The CCA Roadmap is the Department's initial effort in considering the potential risks of climate change to the Department and the Homeland Security Enterprise. The risks posed or exacerbated by a changing climate—such as intensifying extreme weather events and sea ice changes in the Arctic—transcend national borders, and may affect our core homeland security missions in new and complex ways. As DHS develops a better understanding of how climate change may affect our strategic landscape, we can more effectively manage risks to our Nation's security.

As a key DHS long-range planning document, the CCA Roadmap considers our posture today, spans the Future Years Homeland Security Plan through 2018, and goes beyond into the future. It also establishes a direct linkage between CCA activities and our existing environmental sustainability and efficiency efforts, as recognized in the Department's Strategic Sustainability Performance Plan, also an EO 13514 requirement.

By engaging on climate change adaptation now, the Department is better able to understand and minimize critical uncertainties, take steps to address potential vulnerabilities, and provide foundational support to the Homeland Security Enterprise in adapting to climate change now and into the future.

Thank you,

Jane Holl Lute

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# Executive Summary

## The Department, Strategic Drivers, and Climate Change

Today's security environment is increasingly defined by borderless and unconventional threats, global challenges, and long-term trends. Informed by the National Security Strategy (2010) and the strategic framework established in the Quadrennial Homeland Security Review Report (2010) (QHSR), the Department's strategy methodology examines both current and future security environments to understand and reduce uncertainty associated with key trends and strategic drivers. These trends and drivers are enduring social, technological, economic, environmental, and political forces that can cause significant change in domains relevant to the Department and the Homeland Security Enterprise.

Climate change is one such strategic driver. Not an end unto itself, but rather a force that is likely to shape the strategic environment, it must be accounted for in Departmental policy, strategy, plans, business processes, programs, institutional practices, and operations in order to best position the Department for success over the long term, regardless of how the future unfolds. Understanding how major strategic drivers such as climate change may evolve is at the crux of effectively and decisively managing risks to the Nation's security.

Climate change represents a complex homeland security challenge with strategic implications for the Department. The risks posed or exacerbated by a changing climate—such as intensifying and more frequent extreme weather events, natural disasters, and sea ice changes in the Arctic—may either directly or indirectly affect core homeland security missions. As with any risk to homeland security, the Department must consider the likelihood and consequences associated with climate change in order to proactively manage risk in an informed way. To that end, the Department of Homeland Security (DHS) Climate Change Adaptation (CCA) Roadmap represents the Department's long-range planning effort to frame, analyze, and adapt to the potential



Courtesy of FEMA

impacts of climate change across its homeland security missions.

## Alignment with Executive Order 13514 and Roadmap Scope

The DHS CCA Roadmap fulfills the Executive Order (EO) 13514, *Federal Leadership in Environmental, Energy and Economic Performance* (October 2009) requirement for all Federal Agencies to reinforce and comply with the U.S. Government's efforts to develop a national climate change adaptation strategy and, as such, is the Department's supporting adaptation plan.

This Roadmap represents a first step for the Department to develop a more proactive posture to manage climate change risks and adapt to potential impacts of climate change. Based on the Secretary's guidance, the initial focus areas of the Roadmap include Departmental cross-cutting adaptation activities, resilient critical infrastructure and key resources, resilience to disasters, and the Arctic. It is not intended to encompass the full spectrum of potential adaptation efforts for DHS. As U.S. policy, strategy and the study of climate science matures, the focus areas for climate change adaptation may change. As such, this Roadmap is intended to be a "living document" that will be re-evaluated in concert with

the QHSR cycle. In addition, this Roadmap does not address mitigation efforts—those are included in the Department's Strategic Sustainability Performance Plan (SSPP), which establishes an integrated approach for sustainability activities; however, the SSPP and the CCA Roadmap are nested and synchronized.

The 42 actions contained in the CCA Roadmap are not requirements for implementation; rather, they are analytically informed policy, planning, and decision support activities the Department should consider and execute as resources allow. The Roadmap provides validation for these CCA activities, allowing them to compete for attention, prioritization, and resourcing within the Department's established business processes. Where appropriate, they are intended to integrate within existing programs, assessments, performance metrics and other business functions.

## Overview of the DHS CCA Roadmap

The 42 actions identified in the CCA Roadmap are the result of deliberate study and analysis by select DHS headquarters elements and operational Components. As with all homeland security activities, these actions seek to ensure security, resilience, and customs and exchange with the world across all core mission areas. By

engaging on climate change-related issues now, the Department will be able to define and minimize uncertainties, take steps to address current and medium-term vulnerabilities, and provide foundational support to the Homeland Security Enterprise to address climate change into the future.

Based on the Secretary's FY 2011 CCA Implementation Guidance, actions included in the Roadmap address four strategic objectives:

1. Manage climate risks for cross-cutting or other key homeland security issues.
2. Protect and ensure the resilience of critical infrastructure and key resources (CIKR) to potential impacts of climate change.
3. Ensure the Nation's resilience to more frequent or extreme weather events and natural disasters.
4. Contribute to safety, stability, security and environmental protection in the Arctic.

The CCA Executive Steering Committee, the governing body established to oversee DHS's climate change adaptation effort, is charged with developing and maintaining the CCA Roadmap.



Courtesy of USGCRP

## Summary of Actions

The following actions will guide the Department's adaptation efforts in the near, medium, and long term. The desired end-state resulting from these actions and continued DHS adaptation efforts is:

*DHS and its partners across the homeland security enterprise are postured to manage climate risks and will adapt to the impacts of climate change to ensure security, resilience, and customs and exchange for the Nation.*

### 1. Cross-Cutting, Departmental Activities

These 17 actions aim to address risks associated with climate change for cross-cutting, Department-wide issues or issues that require intra-Departmental coordination. These actions enhance climate change adaptation communication with stakeholders, identify key Department-wide analytic gaps requiring further analysis and decision support, integrate climate change adaptation into the Department's interagency activities, and enhance internal Departmental maturing and strengthening activities, as identified in the QHSR and in the Bottom-Up Review Report (2010).

### 2. Resilient Critical Infrastructure and Key Resources

These five actions aim to ensure the resilience of CIKR to the potential impacts of climate change. DHS must partner with CIKR owners and operators to determine climate change risks and identify potential adaptation measures. The National Infrastructure Protection Plan partnership framework provides an existing vehicle for integrating climate change adaptation activities into ongoing resilience and reporting activities. These efforts will promote earlier, less costly, and non-duplicative adaptation activities, and will enhance resilience planning and resourcing, in both the government and private sectors.

## 3. Resilience to Disasters

These eight actions seek to ensure the Nation's resilience to more frequent or extreme weather events and natural disasters. Changes to patterns of natural disasters may impact the Federal Emergency Management Agency's (FEMA) long-term vision of mitigating physical and economic loss—with the potential to strain response and recovery resources and limit the Department's ability to adequately prepare for a "new normal" of more frequent disasters. The most significant climate change impacts will likely affect the following core FEMA areas: policy frameworks and stakeholders; risk information and standards; grant regulations, policies, and funding; research and analytic capabilities; and operations and workforce.

## 4. Safety, Stability, Security, and Environmental Protection in the Arctic

These 12 actions support DHS equities and the national Arctic policy objectives outlined in National Security Presidential Directive-66 / Homeland Security Presidential Directive-25, "Arctic Region Policy" (2009), and are intended to serve as a foundation to prepare DHS and the Nation to address safety, stability, stewardship, and security concerns in the Arctic.



Courtesy of USCG



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# PART I:

*The purpose of Part I of the CCA Roadmap is to provide the background, governance, and process of the CCA effort; outline the framing guidance; and summarize the potential climate change risks to DHS.*

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# 1. Background, Governance and Process

*"The danger from climate change is real, urgent, and severe. The change wrought by a warming planet will lead to new conflicts over refugees and resources; new suffering from drought and famine; catastrophic natural disasters; and the degradation of land across the globe."*

- National Security Strategy (2010)

## A. Background

In the National Security Strategy (2010), the President identified climate change as a major challenge for the Nation and a significant threat to national security. In October 2009, the President issued Executive Order (EO) 13514, requiring Federal Agencies to support the U.S. Government's efforts to develop a national climate change adaptation strategy. This process, coordinated across the U.S. Government through the Interagency Climate Change Adaptation Task Force, will ultimately establish and implement coordinated climate change adaptation plans for all Federal Departments and Agencies.

DHS recognizes climate change as a complex homeland security challenge with strategic implications for the Department. The Quadrennial Homeland Security Review Report (2010) (QHSR) states: "Climate change is expected to increase the severity and frequency of weather-related hazards, which could, in turn, result in social and political destabilization, international conflict, or mass migrations." Climate change has also been identified as a security risk by the National Intelligence Council, the Department of Defense, and the Central Intelligence Agency.

Overall, climate change is expected to potentially affect the severity, rate, and/or frequency of extreme weather events, melting of ice sheets in the Arctic, sea-level rise, droughts, floods, and the spread of life-threatening diseases. In addition to these direct impacts, other significant impacts to the U.S. are anticipated to be *indirect*-linked to effects of climate change on other countries and their potential

to affect U.S. security interests. In this way, climate change acts as a "threat multiplier," aggravating stressors, such as poverty, environmental degradation, and social tensions, which can destabilize human systems and institutions.

Variability still exists with respect to the precise magnitude or rate of change associated with climate change, and there are information gaps and limitations to what climate models can predict. Regardless, the uncertainty related to climate change must be considered in the same manner in which DHS manages any other risk to homeland security.

Understanding how major strategic drivers such as climate change may evolve is at the crux of effectively and decisively managing risks to the Nation's security. Taking proactive steps to understand and address the homeland security implications of climate change will better posture the Department to effectively lead the Homeland Security Enterprise and operate across all of its missions, as defined in the QHSR, now and in the future. To that end, the DHS CCA Roadmap represents the Department's long-range planning effort to frame, analyze, and adapt to the potential impacts of climate change across its homeland security missions.

## Alignment with Executive Order 13514

DHS climate change adaptation efforts are driven by EO 13514. The Federal Agency Climate Change Adaptation Planning Implementing Instructions for EO 13514 (2011) direct Federal Agencies to complete nine major requirements by June 2012. Publication of the DHS CCA Roadmap satisfies the requirement

to develop an Agency adaptation plan. The DHS CCA Roadmap does not address mitigation efforts—those are included in the Department's Strategic Sustainability Performance Plan (SSPP), which establishes an integrated approach for sustainability activities. However, the DHS SSPP and the DHS CCA Roadmap are nested and synchronized.

## B. CCA Executive Steering Committee Governance Structure

In Fiscal Year (FY) 2011, the Department established a governance structure for climate change adaptation planning, fulfilling a requirement from the Secretary's Implementation Guidance. The CCA Executive Steering Committee (ESC), led by the Senior Counselor to the Secretary, is chartered with achieving the following objectives:

- Initiating the integration of climate change into DHS' operational and long-term planning as a key strategic driver and incorporation of climate change into the Department's strategies, plans, business processes, and programs;
- Coordinating and overseeing the Department's activities associated with climate change adaptation;
- Serving as the primary oversight body for climate change adaptation.

Further, the CCA ESC is tasked with developing and maintaining the DHS CCA Roadmap.

The Committee is chaired by the Senior Counselor to the Secretary within the Office of the Secretary. Its initial membership is comprised of senior-level representatives from the Federal Emergency Management Agency (FEMA), the National Protection and Programs Directorate (NPPD), the U.S. Coast Guard (USCG), U.S. Citizenship and Immigration Services (USCIS), the Management Directorate (MGMT), the Science and Technology Directorate (S&T), the Office of Intelligence and Analysis (I&A), the Office of Health Affairs (OHA), the Office of Policy (PLCY), and the Office of the General



Courtesy of USGCRP

Counsel (OGC). The CCA Executive Steering Committee meets quarterly and monitors the progress of the Department's climate change adaptation efforts, submitting an update to the Secretary on a quarterly basis.

### CCA Director Group

PLCY leads the director-level (General Schedule-14/Commander or General Schedule-15/Captain-level) working group that supports the CCA ESC. The CCA Director Group is formed from the CCA ESC Components and tasked with implementing the DHS CCA requirements. This group is responsible for shaping issues for CCA ESC consideration and developing the CCA Roadmap for approval by the CCA ESC. In FY 2011, three subgroups were formed to address the Secretary's three focus areas for FY 2011: resilient critical infrastructure and key resources (led by NPPD); resilience to disasters (led by FEMA); and ensuring safety, stability, and security in the Arctic (led by USCG). The Director Group considered and developed Roadmap actions for the Departmental cross-cutting issues focus area.

Figure 1 depicts the DHS governance structure, and also provides the coordinating relationship between the DHS governance structure and the White House Council on Environmental Quality (CEQ) and the U.S. Global Change Research Program and its associated National Climate Assessment entities.

### C. Methodology: Long-Range Planning Process for Climate Change Adaptation

Assisted by the PLCY Office of Strategic Plans, the Director Group developed the DHS Climate Change Adaptation Process in order to methodically and analytically examine the challenges posed by climate change. This process is approved by the DHS CCA ESC and has been used by the Department to guide CCA activities. The analytic process is based on the DHS Strategy Development Methodology.

The climate change adaptation initiative represents the Department's first long-range planning effort focused on a strategic driver. The CCA effort enabled the Department to develop a long-range planning methodology, grounded in the overarching approach and methodology for strategy development. The CCA analytic process is informed by best practices for climate change adaptation planning from across government, academia, and the private sector. The process identifies nine consistent process elements, which have been tailored to inform and integrate with existing DHS business processes.

Figure 2 provides a summary of the analytic process.

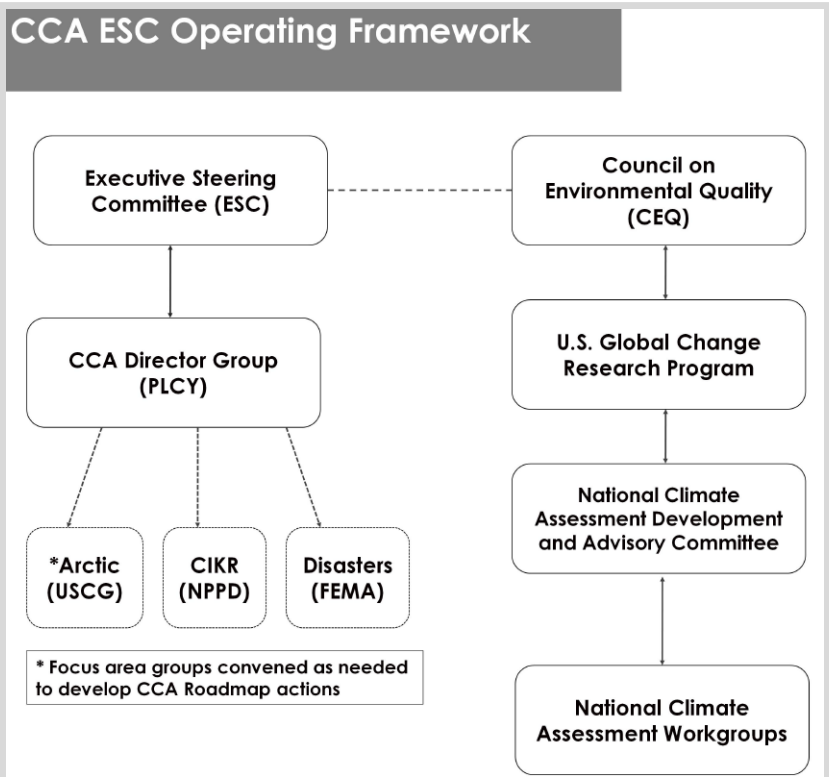


Figure 1: Climate Change Adaptation Executive Steering Committee Operating Framework

### DHS Climate Adaptation Process

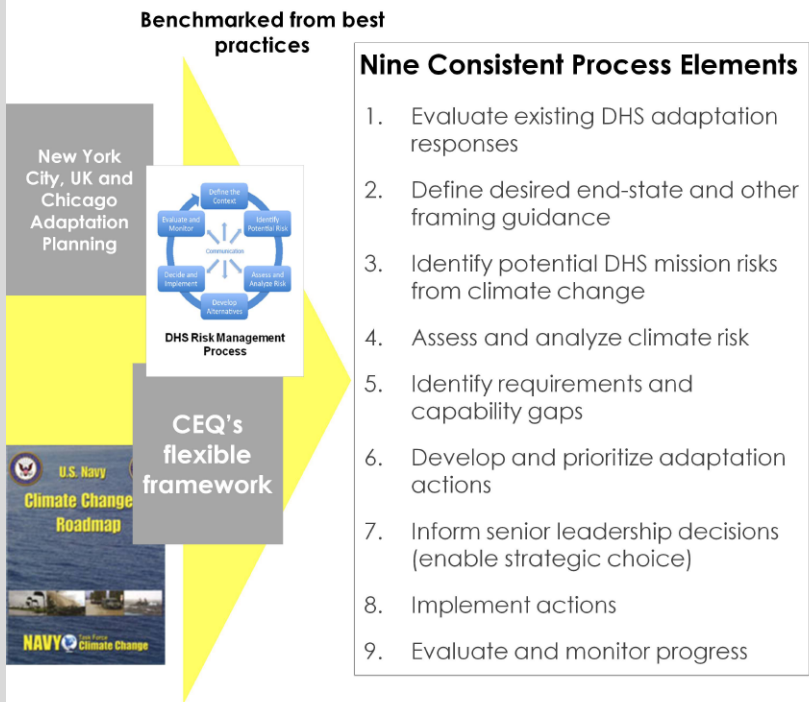


Figure 2: DHS Climate Adaptation Process

## Establishing a Base Case

As a fundamental element in executing step 1 of the adaptation process, the Director Group conducted a strategic inventory of existing or planned activities related to climate change adaptation. This produced a list of initiatives already in place across the Department that, directly or indirectly, support climate change adaptation. The strategic inventory informed the “Base Case,” which revealed that certain Components had already identified climate change as a potential risk and begun planning efforts (e.g., FEMA and USCG).

## Key Definitions

The CCA ESC approved the following key definitions in order to synchronize the Department’s sustainability (which includes climate change mitigation) and climate change adaptation activities. Note that the definition of sustainability is drawn directly from the DHS SSPP, while the definitions of mitigation and adaptation are drawn directly from the CEQ.

- **Adaptation:** Adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects.
- **Mitigation:** An intervention to reduce the causes of changes in climate, such as through reducing emissions of green house gases to the atmosphere.
- **Sustainability:** To create and maintain conditions under which humans and nature can exist in productive harmony that permit fulfilling the social, economic, and other requirements of present and future generations. At DHS, the sustainable approach balances cost, schedule, operations, maintenance, safety, and employee morale while creating and maintaining conditions that fulfill the economic, environmental, and security needs of the American people.



Courtesy of NOAA/OAR/OER

## 2. CCA Framing Guidance

Early in the planning process, the CCA ESC defined and approved critical elements of framing guidance to scope and shape the Department's efforts. The CCA end-state articulates the aspirational posture for the Department, realized as a result of successful implementation of long-range planning activities, which defines and describes the desired future state of the organization and associated attributes. Other key elements of framing guid-

ance include determination of fundamental strategic guidance, including senior leadership intent or vision, statute, authorities, and directives; development of necessary strategic assumptions and objectives or lines of effort to guide execution; and definition of the strategic framework (i.e., parameters of the issue, including premise, scope, approach, time, space, and stakeholders).

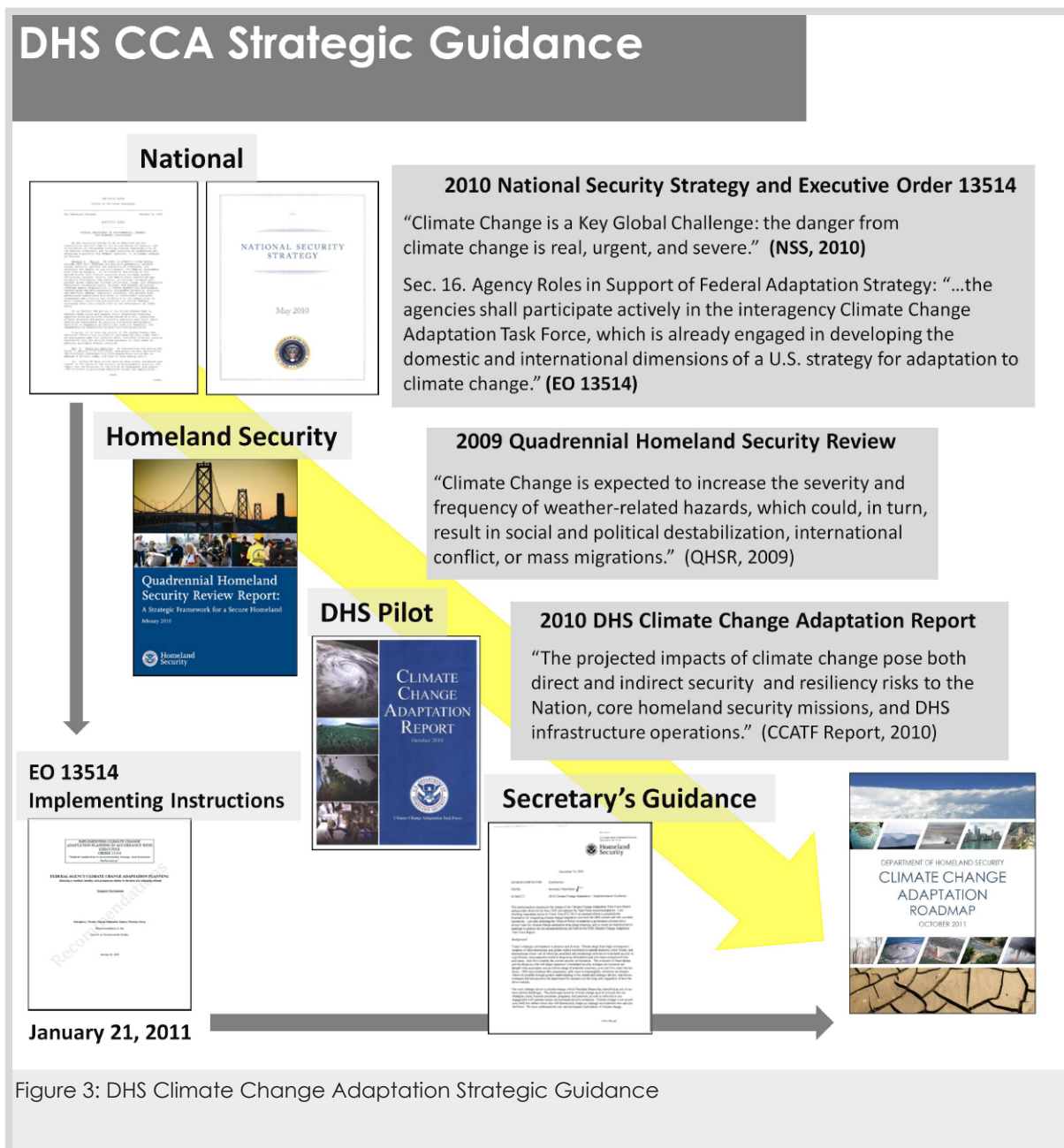


Figure 3: DHS Climate Change Adaptation Strategic Guidance

## A. Strategic Guidance

In response to EO 13514, the DHS Climate Change Adaptation Task Force was established in January 2010 as a pilot effort to assess how climate change could affect DHS missions, policies, and programs. Through expert research and mission-specific analyses, the DHS Task Force's report concluded that risks of climate change are significant and have real implications for homeland security, and that DHS must begin now to plan, prepare for, and adapt to current and future changes in a way that will allow the Department to fulfill its missions.

Following this report, Secretary Napolitano issued the DHS Implementation Guidance for Climate Change Adaptation on December 10, 2010, directing the Department to establish the foundation for integrating climate change adaptation into DHS strategy, business processes, and operations. The CCA Executive Steering Committee was chartered in January 2011 to provide senior leadership, guidance, and oversight to the climate change adaptation effort.

With the Secretary's guidance, the CCA Executive Steering Committee also developed the DHS Policy on Climate Change Adaptation, fulfilling a requirement of EO 13514. This policy, signed by the Deputy Secretary on August 30, 2011, directs DHS to focus its initial climate change adaptation efforts on ensuring that climate change impacts are considered in Departmental planning to protect and ensure the resilience of critical infrastructure and key resources, ensure resilience to disasters, and contribute to safety, stability, security and environmental protection in the Arctic. Over time, the Department will expand its planning to include potential climate change implications to securing and managing our borders, enforcing and administering our immigration laws, and other homeland security missions.

Together, these documents comprise the strategic guidance for the Department's climate change adaptation activities. Figure 3 depicts the strategic guidance informing the DHS CCA long-range planning effort.

## Desired End-State

*DHS and its partners across the homeland security enterprise are postured to manage climate risks and will adapt to the impacts of climate change to ensure security, resilience, and customs and exchange for the Nation.*

## B. Strategic Assumptions

Strategic assumptions document critical uncertainties, important enduring trends that will influence strategy, and expectations about the direction of key policy issues over the timeframe of the planning effort. The ESC-approved Strategic Assumptions for the DHS CCA effort are:

1. U.S. Government policy recognizes the global climate is changing; the DHS posture regarding climate change and adaptation activities nests in established U.S. Government policy.
2. The existing body of government and academic peer-reviewed scientific research serves as the foundation for DHS adaptation activities (DHS will not engage in research on the causes of climate change).
3. DHS's primary responsibility is to focus on the Department's own adaptation activities; however, the scope of some activities may need to consider an enterprise-wide approach.

## C. Strategic Objectives

As derived from Secretarial guidance for FY 2011, the Department's climate change adaptation efforts are focused on four strategic objectives:

1. **Cross-cutting Issues** – Manage climate risks for cross-cutting or other key homeland security issues.
2. **CIKR** – Protect and ensure the resilience of our critical infrastructure and key resources to potential impacts of climate change.

3. **Disasters** – Ensure the Nation's resilience to more frequent or extreme natural disasters as the climate changes.
4. **Arctic** – Contribute to safety, stability, security, and environmental protection in the Arctic in the face of a changing climate.

## D. Climate Change Adaptation Framework

### Strategic Premise: Climate Change as a Strategic Driver

The Department's strategy methodology examines both current and future security environments to understand and reduce uncertainty associated with key trends and strategic drivers. These trends and drivers are enduring social, technological, economic, environmental, and political forces that can cause significant change in domains relevant to DHS and the Homeland Security Enterprise. Climate change is one such strategic driver. Not an end unto itself, but rather a force that is likely to shape the strategic environment. It should be infused into our strategies, plans, business processes, programs, practices, and operations in order to best position the Department for success over the long term, regardless of how the future unfolds.

### Scope: DHS-centric; Homeland Security Enterprise Informed

The scope of the Department's climate change adaptation framework is DHS-centric, but also informed by the Homeland Security Enterprise as necessary, including consideration of the equities of Federal and State, Local, Tribal and Territorial (SLTT) partners, and the private sector.

### Approach: Risk-Informed

Aligned with EO 13514, DHS uses a risk-informed approach to examine the threats, vulnerabilities, and potential consequences of climate change to the DHS mission space.

### Timeframe: Near, Medium, and Long Term

Based on the Secretary's Implementation Guidance, DHS considers climate change in the near, medium, and long term.

- **The Current Posture (near term)** is captured within the current budget execution year and in the President's Budget Submission year (in this case, FY 2012 and FY 2013, respectively). As depicted in Figure 4, DHS is currently concentrating its efforts on the Secretary's three focus areas, as well as other related tasks from the 2010 Implementation Guidance.
- **The Conforming Posture (medium term)** is the five-year window from FY 2014-FY 2018. It is the timeframe on the horizon where DHS can shape adaptation activities in its Future Years Homeland Security Plan (FYHSP). In this manner, in each budget cycle, DHS will have the opportunity to allow climate change adaptation activities to compete for resources in the budget formulation process.
- **The Objective Posture (long term)** is the timeframe outside the FYHSP beginning in FY 2019, and is what DHS defines as the Future Security Environment. In this area, DHS is concerned with understanding the indicators, warnings, and thresholds that could trigger reviews (e.g., reviews of planning assumptions) based on changes in the strategic environment. This is especially relevant to investments in real property (purchases, long-term leases, and construction) that might be vulnerable to the impacts of climate change.

Climate change adaptation is not envisioned as a discrete program for the Department, but rather a portfolio that is integrated into multiple, established Departmental programs. Near-term actions in FY 2012 are intended to serve as the catalyst to introduce adaptation recommendations into the budget process in the medium term. Initial recommendations from the Roadmap will be submitted in time to inform the development of the DHS FY 2014 Integrated



Planning Guidance, and these considerations will be briefed to the Program Review Board as part of the FY 2014 program review. In the long term, the Department aims to integrate climate change into DHS's operational and long-range planning efforts through strategy development, resource allocation and major acquisition oversight, and operational planning processes.

Figure 4 depicts this framework.

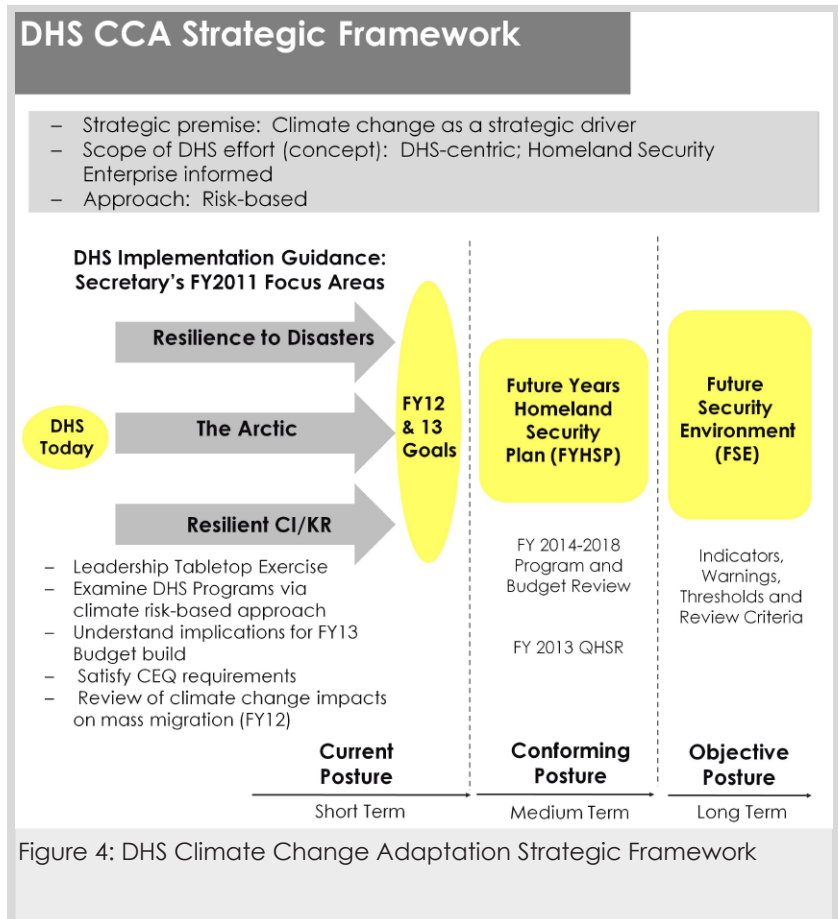


Figure 4: DHS Climate Change Adaptation Strategic Framework

### 3. Climate Change Risks

*"The scarcity of and potential competition for resources like water, food and space, compounded by an influx of refugees if coastal lands are lost, does not only create a humanitarian crisis but creates conditions of hopelessness that could lead to failed states and make populations vulnerable to radicalization. These challenges highlight the systemic implications and multiple-order effects inherent in energy security and climate change."*

- Admiral Mike Mullen, Chairman of the Joint Chiefs of Staff, October 2010

#### A. DHS Missions and Potential Impacts of Climate Change

The vision of homeland security, as outlined in the QHSR, is to ensure a homeland that is safe, secure, and resilient against terrorism and other hazards where American interests, aspirations, and way of life can thrive. Over the coming decades, the projected impacts of climate change pose both direct and indirect risks to U.S. security and resilience, across all DHS missions and activities.

Figure 5 provides a summary of how DHS seeks to manage risks to homeland security with respect to climate change. This "lens" on climate change describes how the Department views climate change as a strategic driver, as well as other key tenets of its risk management approach.

The following narratives provide a high-level analysis of the potential impacts of climate change across the QHSR missions and activity areas of the Department. Further, the associated high-level vulnerability assessment section fulfills a requirement of EO 13514.

## Framing Guidance: Homeland Security Lens on Climate Change

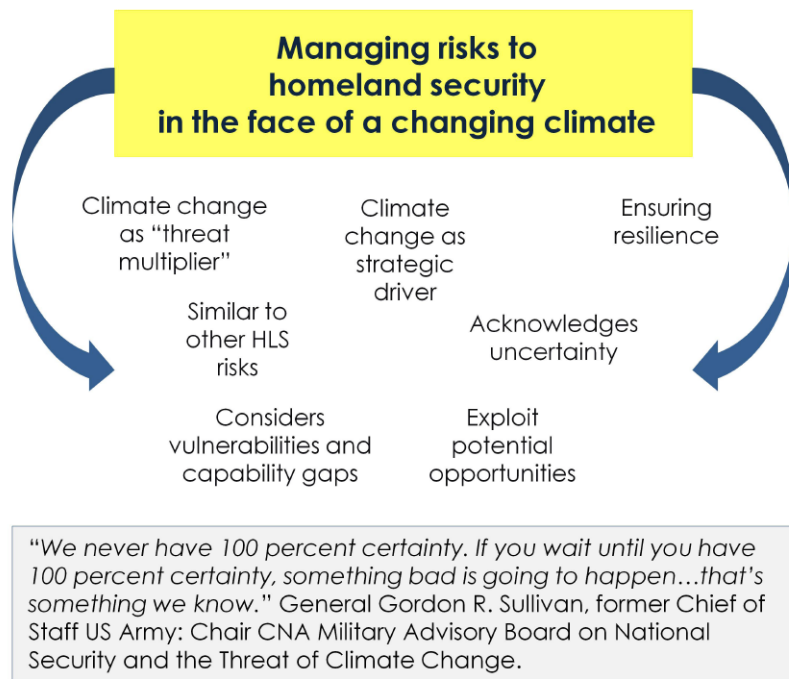


Figure 5: Framing Guidance: Homeland Security Lens on Climate Change

ments (both legal and illegal) across the U.S. border, leading to potential increases in drug trafficking, human smuggling, and transnational criminal organization activity. Melting sea ice in the Arctic may lead to new opportunities for shipping, tourism, and resource exploration, but the increase in human activity may require a significant increase in operational capabilities in the region in order to safeguard lawful trade and travel and to prevent exploitation of new routes for smuggling and trafficking. In addition, higher temperatures may change patterns of human, animal, and plant diseases, putting the DHS workforce at points of entry under increased strain and at higher risk of illness.

### Mission 3: Enforcing and Administering our Immigration Laws

### Mission 1: Preventing Terrorism and Enhancing Security

The impacts of climate change could directly affect the Nation's critical infrastructure. In U.S. coastal regions, rising sea levels, higher storm surge, and increased erosion could damage or destroy critical infrastructure. In Western States, higher temperatures and more frequent or severe heat waves could buckle railways, damage roads, and strain power systems. Indirectly, climate change acts as a "threat multiplier," aggravating stressors abroad such as poverty, environmental degradation, and social tensions, resulting in conditions that could enable terrorist activity, violence, and mass migration.

### Mission 2: Securing and Managing our Borders

More severe droughts and tropical storms, especially in Mexico, Central America, and the Caribbean, could increase population move-

The U.S. may need to prepare for more frequent, short-term, disaster-driven migration, such as mass migrations. DHS may also face pressure to formally recognize "environmentally-induced migrants," which could pose legal and ethical issues for the U.S. and the Department, and could result in changes to DHS legal authorities, policies, procedures, and operations.

### Mission 4: Safeguarding and Securing Cyberspace

As cyber and communications networks become an increasingly integral part of government, business, and private life, system vulnerabilities may create new opportunities for attack or disruption. Higher temperatures and more intense storms may cause damage or disruptions to telecommunications and power systems, creating challenges for telecommunications infrastructure, emergency communications, and cybersecurity. Strains to DHS facilities, national power systems, and telecommunications networks could impact the ability of the Department to carry out each



Courtesy of NOAA

of its missions.

## Mission 5: Ensuring Resilience to Disasters

More intense storms, frequent heavy precipitation, heat waves, drought, extreme flooding, and higher sea levels could significantly change the types and magnitudes of hazards impacting communities and the emergency management professionals serving them at both Federal and SLTT levels. As coastal regions become increasingly populated and developed, more frequent or severe storms will increase the requirements for emergency services and response and recovery capacity. Continuity of operations, delivery of services, and emergency response might be challenged and made increasingly complex by damages or disruptions to the interconnected energy and infrastructure networks. In addition, the reliance of mitigation programs and standards across the Department on data from historical records may not accurately project future risks as the climate changes, which may lead to inadequate preparedness for future disasters.

## Providing Essential Support to National and Economic Security

DHS leads and supports a number of activities that provide essential support to national and economic security, including: providing trained and ready forces to work with inter-agency partners for U.S. international security and assistance missions, conducting and supporting other law enforcement activities,

and maintaining the safety and security of the marine transportation system. If there are more severe or frequent natural disasters abroad or the indirect results of climate change fuel international conflicts, DHS could be called on to provide support to national defense or reconstruction/stabilization missions at increased rates. Increased population movements due to climate change could lead to potential increases in human smuggling, placing greater strain on DHS to prevent the exploitation of persons. In addition, a changing environment in the Arctic will challenge DHS's ability to ensure the safe operation and resilience of the marine transportation system, protect and preserve living marine resources, and safeguard the marine environment.

## Maturing and Strengthening DHS

Maturing and strengthening the Homeland Security Enterprise includes strengthening DHS's workforce, enhancing shared awareness of risks and threats, and fostering unity of effort. Changing patterns of human, animal, and plant diseases due to climate change, however, could put DHS's workforce at points of entry under increased strain and at higher risk of illness. Rising temperatures could impact information technology and telecommunications infrastructure, challenging DHS's ability to conduct information sharing as well as analyze and disseminate timely intelligence information. In addition, severe weather events, mass migration issues, pandemics, and degraded CIKR could stretch Federal resources, placing a greater burden on SLTT and private sector partners.

## B. High-Level Risk Assessment: Climate Change Impacts, Potential DHS Vulnerabilities and Consequences

Potential Climate Change Impact	Potential DHS Vulnerabilities	Potential DHS Consequences
<ul style="list-style-type: none"> <li>Changes in the types, frequency, and intensity of hazards.</li> </ul>	<ul style="list-style-type: none"> <li>Affects degree of preparedness for emergency management professionals and communities.</li> <li>Threatens resiliency, integrity, and operation of infrastructure across all 18 CIKR sectors.</li> <li>Exacerbates border control issues.</li> <li>Creates conditions for easier transmission of diseases, heightening the risk of pandemic.</li> <li>Changes patterns of human, animal, and plant diseases.</li> </ul>	<ul style="list-style-type: none"> <li>Affects the allocation and distribution of resources and facilities.</li> <li>Makes existing flood plain management and construction standards inadequate.</li> <li>Strains Federal Disaster Relief Funding (DRF).</li> <li>Causes strains to disaster recovery operations due to inadequate supplies, facilities, and assets.</li> <li>Increases potential need for DHS to support management and care of displaced populations in disaster-response situations.</li> <li>Strains DHS's capacity to support survivors' immediate and long-term needs.</li> <li>Increases costs of National Flood Insurance Program and higher premiums increase financial tolls on businesses and homeowners.</li> <li>Contributes to potential mass migration.</li> <li>Increases pressure from the international community to formally recognize "environmentally-induced migrants."</li> <li>Increases demand for disaster-relief efforts abroad.</li> <li>Challenges enforcement, processing, and response capacities with respect to mass migration.</li> </ul>

Potential Climate Change Impact	Potential DHS Vulnerabilities	Potential DHS Consequences
<ul style="list-style-type: none"> <li>• Increased catastrophic storms.</li> <li>• Increased flooding.</li> <li>• Expanding riverine floodplains.</li> <li>• Rising sea levels and storm surges.</li> </ul>	<ul style="list-style-type: none"> <li>• Affects DHS's ability to orchestrate and conduct emergency response and maritime operations.</li> <li>• Stresses vital infrastructure such as energy and water systems.</li> <li>• Disrupts transit and compromises the structural integrity of lines of surface transportation (e.g., highways, roads and bridges).</li> <li>• Affects waterway and port channel depths.</li> <li>• Affects the accuracy of mapping information used by emergency responders and decision-makers for planning, response, and resource allocation.</li> <li>• Affects the operational availability of Coast Guard units and installations.</li> <li>• Creates frequent public service disruptions. (i.e., access to fossil fuels, water, and electricity).</li> <li>• Impacts structural integrity of infrastructure, increasing vulnerability to terrorist attacks.</li> <li>• Increases vulnerability of coastal infrastructure (especially port facilities, transportation hubs, and energy production) and delivery systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Affects the allocation and distribution of USCG resources and facilities.</li> <li>• Increases dredging costs.</li> <li>• Makes current risk data out-of-date and/or obsolete.</li> <li>• Requires upgrades or movement of USCG facilities.</li> <li>• Contributes to mass migrations.</li> </ul>

Potential Climate Change Impact	Potential DHS Vulnerabilities	Potential DHS Consequences
<ul style="list-style-type: none"> <li>Droughts/loss of arable land.</li> <li>Rising temperatures and heat waves.</li> </ul>	<ul style="list-style-type: none"> <li>Fluctuations in agricultural production may disrupt food supplies.</li> <li>Increase susceptibility to wildfires and to mudslides in areas deforested by wildfires.</li> <li>Threatens transportation operations, damages roads/rails, impacts aircraft performance and runway length, and increases use of energy.</li> </ul>	<ul style="list-style-type: none"> <li>Exacerbates social instability and regional crises.</li> <li>Increases domestic instability abroad, resulting in potential conditions for terrorist activity or state-to-state violence, and mass sea migration.</li> <li>Creates conditions for intra-state migration.</li> <li>Closes or exacerbates delays at airports due to decreased visibility from wildfires.</li> <li>Creates loss in agricultural base and subsequent economic loss.</li> <li>Affects emergency response capabilities and DHS planning, budgeting, and operational dynamics.</li> <li>Increases cases of heat stress and cardiovascular failure.</li> <li>Affects ability to cool power plants.</li> <li>Challenges crop and livestock production, exacerbating U.S. economic and financial instability.</li> <li>Changes in the size and location of global fish stocks may produce major changes in the amount and location of USCG regulatory and law enforcement activity, or create conflicts over fishing grounds and violations of state and international agreements.</li> </ul>
<ul style="list-style-type: none"> <li>Melted Arctic sea ice.</li> </ul>	<ul style="list-style-type: none"> <li>Increases accessibility and human activity in Arctic waters.</li> <li>Opens up new shipping routes in the Arctic.</li> </ul>	<ul style="list-style-type: none"> <li>Changes to the global transportation system.</li> <li>Coastlines retreat due to erosion, resulting in higher maintenance costs for ports.</li> <li>Increases potential for environmental disaster.</li> </ul>

Potential Climate Change Impact	Potential DHS Vulnerabilities	Potential DHS Consequences
<ul style="list-style-type: none"> <li>Melted Arctic sea ice.</li> </ul>		<ul style="list-style-type: none"> <li>Increases potential need for safety and security responses.</li> <li>Increases risk of loss of life at sea due to increased maritime activity.</li> </ul>
<ul style="list-style-type: none"> <li>Changing patterns of human, animal, and plant diseases.</li> <li>Spread of infectious diseases.</li> </ul>	<ul style="list-style-type: none"> <li>Threatens U.S. health security.</li> <li>Increases vulnerability of DHS personnel at points of entry, who might be exposed to disease transmission.</li> <li>Affects the prevalence and virulence of diseases sensitive to temperature and rainfall like cholera, diarrheal diseases, malaria, and dengue fever.</li> <li>Affects the potential incidence, seasonal transmission, and geographic range of various infectious diseases.</li> <li>Spreads diseases to U.S. regions previously unexposed and where the population has low immunity.</li> </ul>	<ul style="list-style-type: none"> <li>Strains or overwhelms prevention, response, and recovery operations.</li> <li>Increases workforce illnesses, which could degrade operational capabilities.</li> <li>Causes mental health care concerns, both from interrupted care, geographic displacement, and economic disruption.</li> <li>Overburdens SLTT governments, which may require greater Federal involvement and funding.</li> <li>Increases incidence of disaster-related deaths due to diarrhea, malnutrition, and urban air pollution.</li> <li>Contributes to mass migrations.</li> <li>Threatens community resilience.</li> </ul>
<ul style="list-style-type: none"> <li>Infrastructure damage and collapse.</li> </ul>	<ul style="list-style-type: none"> <li>Makes delivery of DHS services and emergency response capabilities increasingly unreliable.</li> <li>Makes DHS infrastructure inoperable for prolonged periods.</li> </ul>	<ul style="list-style-type: none"> <li>Increases risks to DHS missions and operations.</li> <li>Causes interruptions in health care service.</li> <li>Causes DHS operational assets/ facilities to reach saturation points more quickly or frequently due to greater "wear and tear."</li> <li>Causes a ripple effect across multiple sectors and may stress DHS's ability to execute multiple missions.</li> </ul>

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# PART II:

## CCA Roadmap Actions

*The purpose of Part II of the CCA Roadmap is to present an executive-level summary of the 42 actions that will guide the Department's adaptation effort through the near, medium, and long term.*

The 42 actions contained in the CCA Roadmap are not requirements for implementation; rather, they are analytically informed policy, planning, and decision support activities the Department should consider and execute as resources allow. The Roadmap provides validation for these CCA activities, allowing them to compete for attention, prioritization, and resourcing within the Department's established business processes. Where appropriate, they are intended to integrate within existing programs, assessments, performance metrics, and other business functions.



# Overview of CCA Roadmap Actions

*“The challenges posed by climate change must be infused into our strategies, plans, business processes, programs, and practices, as well as reflected in our engagement with partners across the Homeland Security Enterprise. Climate change is not an end unto itself, but rather a force that will dramatically shape our strategic environment now and into the future.”*

- DHS Secretary’s Implementation Guidance for Climate Change Adaptation, 2010

## Organization of Climate Change Adaptation Actions

CCA Roadmap actions are summarized in sections 1 through 4 of Part II. The actions are organized under the four CCA strategic objectives. Within each of the four strategic objectives, the actions are further divided into three functional categories:

- **Governance, Strategy, and Planning** – Actions that establish institutional governance processes for climate change adaptation or enhance strategic guidance and planning efforts.
- **Analysis and Decision Support** – Actions that provide the knowledge and tools to make informed policy, prioritization, and investment decisions.
- **Operations** – Actions that incorporate climate change adaptation into DHS’s operations, operational structures/posture and functions, workforce, and activities with implications for stakeholders to ensure the Department operates successfully.

### 1. Cross-Cutting Departmental Activities

**These actions aim to manage risks associated with climate change for cross-cutting issues that affect multiple Components or require intra-Departmental coordination.**

*“Climate change is a complex, interdisciplinary issue with the potential to affect every sector and level of government operations.”*

- GAO, “Climate Change Adaptation: Strategic Federal Planning Could Help Government Officials Make More Informed Decisions,” 2009

These 17 actions aim to address risks associated with climate change for cross-cutting, Department-wide issues or issues that require intra-Departmental coordination. These actions enhance climate change adaptation communication with stakeholders, identify key gaps requiring further analysis and decision support, integrate climate change adaptation into long-range planning efforts across the Department, and enhance internal Departmental maturing and strengthening activities, as identified in the QHSR and 2010 Bottom-Up Review.

## Governance, Strategy, and Planning

**Action 1.01: Implement a Department-wide climate change adaptation education and communication plan.** As established in EO 13514, climate change adaptation and sustainability practices are inherently linked as a joint set of activities that together help diminish the rate or severity of climate change and manage the impacts. The Management Directorate will implement a climate change adaptation education plan that will increase awareness among DHS employees about climate change issues, establish climate change adaptation as a portfolio within the Department, and link the Department's adaptation initiative to its broader sustainability efforts.

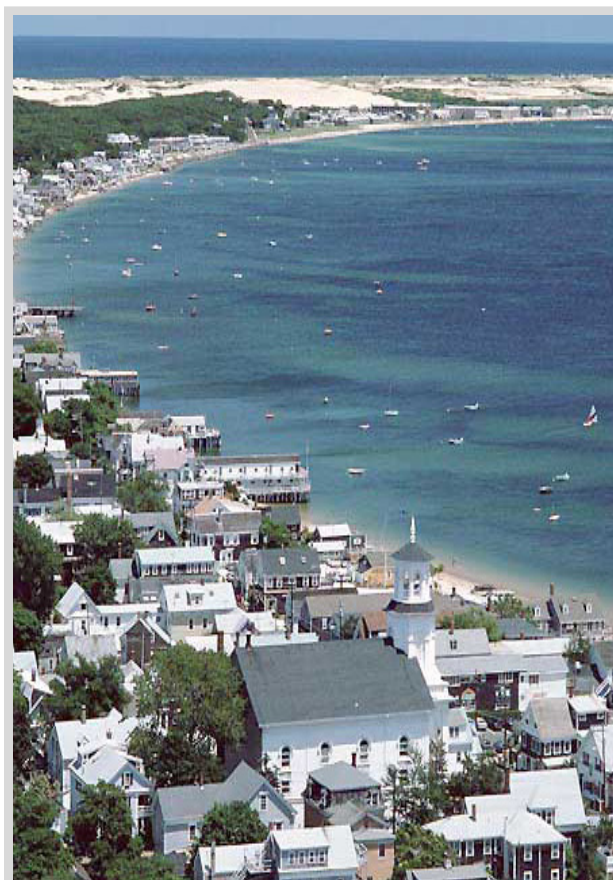
**Action 1.02: Establish the Department's strategic communications plan for its work on climate change adaptation for FY 2012-2013.** Implementing the CCA Roadmap actions and effectively pursuing climate change adaptation planning will require engagement with stakeholders and a forward-leaning posture to shape public communication. The Office of Public Affairs (OPA) will create a climate change adaptation strategic communications plan that will provide a framework for how the Department discusses its adaptation efforts in the public and media, and will enable consistent communication on DHS's climate change adaptation efforts.

**Action 1.03: Integrate Climate Change Adaptation into the Department's engagement agenda with SLTT partners.** As the Department's lead agent for engagement with SLTT partners, the Office of Intergovernmental Affairs will provide updates on climate change adaptation and the Department's efforts as an agenda item for discussion in FY 2012 with the Homeland Security Advisors (HSAs). This will enable collaboration between FEMA, NPPD, USCG and other key DHS Components, and SLTT partners on adaptation issues of mutual concern.

**Action 1.04: Coordinate a Departmental review of the effects of climate change on mass migration.** Changes in the climate are already causing migration and displacement throughout the world—and could lead to mass migration to the United States, as impacts of climate

change become more severe. This has potential implications for customs enforcement and border protection, as well as immigration services and humanitarian protection. To better anticipate these issues, a working group will be established by USCIS—in coordination with the Department of State—to consider the possible effects of climate change on mass migration and review the adequacy of current migration related authorities and operations.

**Action 1.05: Integrate climate change adaptation considerations into international agreements (particularly for Canada, Mexico, Central America, and the Caribbean).** Similar to many other risks, the impacts of climate change do not adhere to international boundaries. PLCY/Office of International Affairs will integrate climate change adaptation considerations into its approach in crafting international agreements and protocols, particularly for the border nations where direct and indirect consequences from climate change could affect the United States.



Courtesy of NOAA



Courtesy of USGCRP

**Action 1.06: Integrate climate change actions from the CCA Roadmap into the DHS FY 2014 Integrated Planning Guidance (IPG), and include climate change actions in the FY 2014 program review process.** The DHS CCA Roadmap is intended to serve as the catalyst to introduce climate change adaptation recommendations into the budget process. Initial recommendations from the CCA Roadmap will be submitted in time to inform the development of the DHS FY 2014 IPG, and these considerations will be briefed to the Program Review Board as part of the FY 2014 program review.

**Action 1.07: Review the actions in the DHS CCA Roadmap and assess what existing programs the actions should be aligned with.** Without aligning the CCA actions to existing programs, DHS will not be able to efficiently or effectively determine the lead agency/program for each action, causing potential delays or redundancies in initiating actions. MGMT will review the actions in the DHS CCA Roadmap and assess what existing programs the actions should be aligned with. MGMT and PLCY will collectively determine alternatives for the CCA Roadmap actions not aligned to an existing DHS program.

**Action 1.08: Provide high-level guidance and connect CCA Roadmap action owners to DHS Performance Community Points of Contact so action owners can develop operational performance measures to track their progress.** DHS's

ability to adapt to potential climate change impacts should be identified and measured by operational action owners. This will ensure that as DHS matures in the area of CCA the staff responsible for implementation will monitor performance.

## Analysis and Decision Support

**Action 1.09: Integrate climate change adaptation into complex event modeling by collaborating with regional and SLTT climate research groups for data to support more accurate forecasts of hazards affected by climate change.** Climate change may create risks that are more regional in nature and require resources from a larger community of partners, demanding joint approaches for managing them. The Science and Technology Directorate (S&T) will coordinate with NPPD, the National Oceanic and Atmospheric Administration (NOAA), and stakeholder organizations to help refine the input data used to support complex event modeling, hazard identification, and risk assessment processes to improve analytical results.

**Action 1.10: Work with interagency partners to manage collection requirements and to stay abreast of collection systems' capabilities to support Departmental intelligence and analysis efforts.** I&A will work with interagency partners to identify gaps associated with threat streams related to climate change, ensure that requirements are adequate and up-to-date, and stay abreast of potential impacts of climate change on collection systems on which we rely.

**Action 1.11: Participate in intelligence community analytic forums and conduct analysis on threat streams that may be impacted by climate change.** To date, the intelligence community has identified health security and illicit travel and migration as the intelligence analysis fields that relate most directly to climate change. I&A will work with appropriate intelligence community bodies and in conjunction with the DHS Intelligence Enterprise to analyze these and other threat streams that may relate to climate change.

**Action 1.12: Promote improved employee health and mission effectiveness through the identification and implementation of protective practices and facilitation of a multi-year**

**strategic implementation plan for employee resiliency programs.** Changes in the geographic distribution of events and disease may alter the hazards for operational personnel. OHA will develop enhanced early detection and warning systems and focus DHSTogether programs on incentives for increased participation and policy changes in support of workforce well-being.

**Action 1.13: Proactively evaluate SLTT climate change medical first responder disaster preparedness activities and ensure DHS has the capacity to provide Federal aid without compromising the Department's mission.** When SLTT partners' capacities to respond to disasters are outstripped by the magnitude or consequences of disasters, DHS and other Federal Agencies are called on to augment their resources. OHA's Medical First Responder Coordination Branch will facilitate the integration of climate change related hazards into SLTT emergency medical services disaster preparedness activities. However, understanding that catastrophic incidents will occur, and that a "new normal" of climate and weather extremes may emerge, OHA will also work with the Operational Components' medical staff to support the policies, training, and requirements they will have.

**Action 1.14: Incorporate relevant information on climate change into biosurveillance analyses and coordinate dissemination of this information to a broader Federal audience to improve**



Courtesy of USGCRP

**situational awareness.** Monitoring how climate change impacts may exacerbate conditions that influence or contribute to bio-threats is an important part of the Department's biosurveillance activities. OHA's National Biosurveillance Integration Center will seek to improve situational awareness of climate change impacts and data that affect biosurveillance activities by coordinating with key interagency partners.

**Action 1.15: Incorporate climate change adaptation into current resilience programs.** By ensuring private sector partners are prepared for the impacts of climate change and disasters, the Department can reduce the demand for DHS assistance following disasters and ensure more rapid recovery. FEMA, S&T, NPPD, the PLCY/Private Sector Office (PSO), and PLCY/Office of Resilience Policy will incorporate climate change adaptation into programs already in development, particularly the Voluntary Private Sector Preparedness Accreditation and Certification (PS-Prep) and Resilience Star.

**Action 1.16: Actively engage the private sector regarding climate change adaptation planning.** The responsibility for homeland security is shared among a wide range of partners, especially key private sector partners. PLCY/PSO will engage the Homeland Security Enterprise's private sector stakeholders in the implementation of the DHS CCA Roadmap by infusing adaptation planning into existing private sector engagement mechanisms such as the Private Sector Resources Catalog.

**Action 1.17: Formally analyze the potential evolution of homeland security strategic drivers and associated trends, including climate change, beyond the five-year budget cycle by examining the future strategic environment.** In order to avoid a reactive posture to climate change impacts, DHS must look beyond the budget horizon to examine potential changes in the strategic environment and how they may create opportunities and challenges to homeland security activities and relevant strategic priorities. In FY 2013, PLCY/Office of Strategy, Planning, Analysis, and Risk (SPAR) will produce a written report, the Future Strategic Environment, which analyzes and bounds uncertainty across all homeland security strategic drivers, including climate change. This action will examine a range of plausible futures to provide tangible insights that inform decision-making at all levels of DHS.

## 2. Resilient Critical Infrastructure and Key Resources

**These actions aim to protect and ensure the resilience of our critical infrastructure and key resources to potential impacts of climate change.**

*“Understanding how climate change may change our strategic landscape is at the heart of effectively managing risks to the Nation’s security. The DHS Climate Change Adaptation Task Force notes that the projected impacts of climate change pose direct and indirect security and resiliency risks to core homeland security missions and DHS infrastructure and operations.”*

- DHS Policy for Climate Change Adaptation, 2011

Protection of CIKR is essential to our Nation’s prosperity, safety, and security. Climate change has the potential to impact all 18 critical infrastructure sectors identified in Homeland Security Presidential Directive 7 and associated guidance. Key potential impacts include the deterioration or failure of coastal infrastructure in the face of rising sea levels and storm surge, strains on power systems from increased population and energy use for cooling, possible dislocation of food production, and scarcity of water.

The 2010 QHSR describes the Department’s responsibilities for managing risks to critical infrastructure. To achieve these goals, DHS must work closely with the private sector, which owns and operates the majority of the Nation’s CIKR, as well as SLTT governments, which control much of the remaining CIKR. These owners are responsible for planning and investing in enhancement, mitigation, relocation, or replacement of infrastructure. As a result, the Department’s role in protecting and ensuring the resilience of CIKR is focused on coordination and collaboration with external stakeholders.

While the risks may seem distant, the lifecycle of infrastructure spans many decades, with service lives that may extend beyond 100 years. Therefore, much of the infrastructure that will be in service 30, 50, even 100 years from now is conceived, planned, designed, and constructed today, as illustrated in Figure 6.

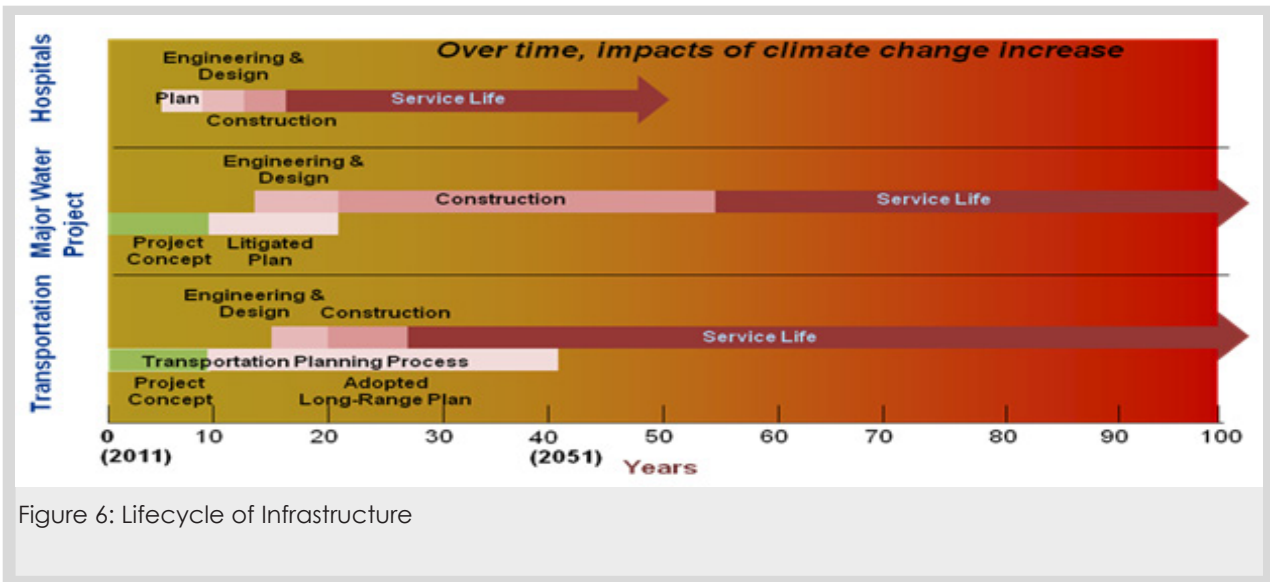


Figure 6: Lifecycle of Infrastructure

To address these concerns, the CCA Executive Steering Committee directed NPPD to establish a CIKR working group to develop actions to enhance the resilience of critical infrastructure. Given the complexity and diversity across the 18 CIKR sectors, the CIKR working group focused its analysis on how climate change could affect five key, “life-sustaining” CIKR sectors: energy, transportation, water, food, and telecommunications. The CIKR working group’s high-level analysis identified several climate change implications that could impact core CIKR programs, capabilities, and operations for the Department and private sector owners. These implications are summarized below:

- **Altering the supply chain** – Whether as a result of increased competition for scarce resources or changes in transit routes, the global supply chain is expected to change as a result of climate change. Shifts in the supply chain could impact all CIKR sectors and the availability of supplies, food, people, water, and power.
- **Power availability** – The electric grid is an essential element of modern society. Climate change is expected to diminish or degrade overall service availability and capacity, with brown-outs becoming more likely as severe weather and extreme temperatures exacerbate demand pressures.
- **“Hubs of vulnerability”** – The confluence of key strategic drivers, such as urbanization, demographic shifts, and economic growth can exacerbate risks posed by climate change. This may create “hubs of vulnerability” across many CIKR sectors that may be unable to cope with power load balancing, agriculture supply disruptions, pestilence, disease, or deadlier disasters.
- **Long-term planning** – Government and businesses make various planning assumptions about the physical environment when making key resource, personnel, and investment decisions. As impacts of climate change increase over time, relying on historical data or risk analysis may not adequately account for the increased risk.

To meet its critical infrastructure protection mission, DHS must partner with CIKR owners and operators to determine the climate change risks and identify potential adaptation measures. The National Infrastructure Protection Plan (NIPP) partnership framework provides an existing vehicle for integrating climate change adaptation activities into the resilience and reporting activities already taking place. The actions in this section, aligned with NPPD’s mission space, describe five key partnering activities that the Department can take to begin to address climate change risk management for critical infrastructure. These efforts will promote earlier, less expensive and non-duplicative adaptation activities, and will enhance resilience planning in both the government and private sectors.

## Governance, Strategy, and Planning

**Action 2.01: Organize the CIKR Community for Climate Change Adaptation.** The private sector owns and operates the majority of the CIKR in the nation, and the majority of the remaining assets are owned by SLTT bodies. The NPPD/Office of Infrastructure Protection (IP) will develop a strategy to engage in a systematic and coordinated public-private sector dialogue with the CIKR community in order to avoid fractured and uncoordinated efforts

to adapt these resources to the impacts of a changing climate. The strategy will focus on collaboration to assess the need for any new or amended policies, procedures or processes that help reduce any adverse effects to national or economic security resulting from impacts of climate change.

## Analysis and Decision Support

**Action 2.02: Collaborate with interagency partners to establish a common analytic baseline for climate change, leveraging existing work**

**and closing any gaps necessary to support regional or sector-specific decisions related to infrastructure resilience.**

The DHS climate change adaptation effort must be grounded in a consistent, shared analytic foundation that leverages the best available science and clarifies the anticipated conditions regionally and nationally. This analytic foundation must 1) provide planning scenarios that facilitate decision-making for DHS and its partners regarding adaptation to climate change; and 2) specify leading indicators and thresholds that can be used for (i) triggering planned actions for mitigating climate change impacts, (ii) determining whether the planning scenarios are unfolding as expected, and (iii) determining when and when the planning scenarios should be updated. This action will be led by the NPPD/IP; it will align with other Departmental activities related to climate change risk analyses and serve as the foundation for further infrastructure-related risk analysis. Furthermore, this analytic baseline is a critical precursor activity for effectively assessing the state of current planning for climate change across CIKR programs.

**Action 2.03: Assess current planning for climate change connected to CIKR.**

The NPPD/IP will lead a comprehensive assessment of all infrastructure-related current planning actions. This action enables DHS to understand if current planning enables reordering, reconstruction, or development of climate change adaptation planning. It also includes planning for assessment of climate change impacts to CIKR, mitigation and adaptation strategies, and an analysis of all risk assessment tools and programs that include climate change as an all-hazards assessment.

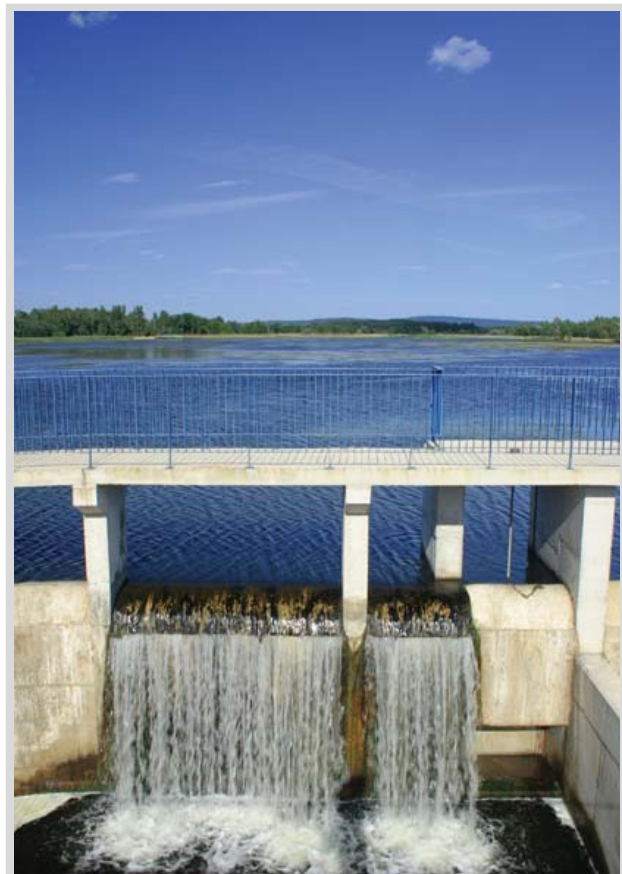
**Action 2.04: Conduct a series of studies for adaptive integrated infrastructure risk management.**

A solid analytic process, based on the best science and involvement from key stakeholders, is essential to identify and assess risks linked to climate change and provide actionable results to decision-makers. Building on the three prior DHS CIKR partnership actions, NPPD/IP, working with other DHS Components and outside partners, will conduct a series of studies to better understand and support infrastructure risk management. These studies will be fully available to support further research by academia and industry, and DHS and partners will consolidate findings into useful tools

and training materials to inform sectors and communities to use in incorporating climate change adaptation into their planning.

**Action 2.05: Monitor societal and environmental trends to provide an “early warning system” to manage risks to critical infrastructure.**

Risks to the Nation's CIKR can come from many sources, and decisions about how best to manage or mitigate risks are highly dependent on knowing the timeframe in which the action must occur (i.e., near-term or long-term). To use resources effectively, DHS must determine which trends are most likely to indicate changes that would negatively impact DHS missions, operations, and infrastructure; allowing DHS Components to know when the need for action is imminent and to plan well enough in advance. To provide such an “early warning system” for impacts that may affect the ability of DHS to fulfill its missions, NPPD/IP will leverage results of Action 2.02 related to the analytic baseline to identify the societal and environmental trends that should be monitored.



Courtesy of USGCRP

### 3. Resilience to Disasters

#### Ensure the Nation's resilience to more frequent or extreme natural disasters as the climate changes.

*"Challenges posed by climate change have the potential to change significantly the types and magnitudes of hazards faced by communities and the emergency management professionals serving them. Combined with other changes to both the manmade and natural environments, especially deteriorating infrastructure, FEMA's operating environment may be significantly impacted."*

- FEMA Strategic Plan: Fiscal Years 2011-2014, 2011

The most visible impacts of climate change will likely result from an increase in the magnitude and frequency of natural disasters, which will affect the resilience of local communities and the response capabilities of emergency management professionals.

Potential climate change risks have implications for the Department's mission to ensure resilience to disasters and FEMA's long-term vision of promoting physical and economic loss reduction measures. Changes to the current patterns of natural disasters may strain response and recovery resources, and may limit the Department's ability to adequately prepare for a "new normal" of increased disasters. To address these challenges, the CCA Executive Steering Committee selected FEMA to lead a working group to develop actions that will posture the Department to ensure the Nation's resilience to disasters as the climate changes.

The FEMA Disaster Resilience Working Group conducted a high-level analysis of the most significant climate change impacts on core Agency programs, capabilities, and operations. These findings, which guided the working group's development of adaptation actions, are summarized in the categories below.

- **Policy and stakeholders** – FEMA lacks an explicit policy to guide and direct needed support mechanisms for the Agency to effectively adapt to a changing climate. Moreover, adaptation strategies implemented by external partners and stakeholders will affect how DHS/FEMA meets its mission of ensuring resilience to disasters. How and to what extent these entities can prepare for and adapt to a changing climate will determine the level of support required by the Federal government.
- **Risk information and standards** – DHS is a consumer and producer of risk data and standards that affect various types of development decisions in risk-prone areas. Changes in the climate will affect the accuracy and practice of using historical records to predict the magnitude, location, and frequency of future hazards. This will challenge the Department's ability to use historical information and data for operations, resource planning, and long-term infrastructure design.
- **Grants** – DHS, and especially FEMA, provide extensive grant funding to SLTT entities across the Nation. Currently, many Departmental grant regulations and policies may not be flexible enough to incentivize sound development and re-building decisions—such as pre- and post-disaster land use—that account for changing conditions.



- **Research capabilities** – Climate change adaptation will require coordination and partnership with the scientific community to develop and use appropriate climate change-related data.
- **Operations and workforce** – Climate change may alter both the Department's operating environment and its planning assumptions. Under these conditions, DHS may need to strategically evaluate what resources are needed, where they are needed, and how the workforce is trained, equipped, and protected to ensure the Nation's resilience to disasters.

Based on this analysis, the FEMA Disaster Resilience Working Group developed eight high-level actions to address the most significant impacts of climate change to ensure the Nation's resilience to disasters. These actions also represent the Department's first major step toward adaptation planning within this QHSR mission area. Accordingly, the actions are focused on FEMA's role in ensuring disaster resilience; as efforts advance, these actions will serve as a foundation for a more comprehensive, Department-wide effort. Lastly, these actions also align with FEMA's vision of a "Whole Community" approach to emergency management, which involves collaboration with the public, all levels of government, the private sector, non-governmental organizations, and community organizations.

## Governance, Strategy, and Planning

### Action 3.01: Develop an overarching, FEMA-wide policy for climate change adaptation.

Projected impacts of climate change may increase existing risks or create new challenges to FEMA's missions and operations. To ensure that Agency adaptation planning efforts are coordinated, mutually supportive, and effective, FEMA will develop a FEMA-wide policy for climate change as well as an organizational process to facilitate the implementation and oversight of disaster response-specific adaptation.



Courtesy of FEMA

### Action 3.02: Continue to study the impacts of climate change on the National Flood Insurance Program (NFIP) and incorporate climate change considerations in the NFIP reform effort.

An initial, two-year study concluded that climate change is likely to have significant impacts on the NFIP; Special Flood Hazard Areas are projected to increase significantly across the Nation, with impacts mounting over time (the number of policyholders is projected to double by 2100). In order to ensure the program serves the public most effectively, FEMA will continue efforts to understand the potential impacts of climate change on the NFIP and identify areas where future climate conditions can be included as part of the larger reform effort.

## Analysis and Decision Support

### Action 3.03: Seek to understand how climate change will impact local communities and engage them in addressing those impacts.

How SLTT entities are able to deal with impacts of climate change will have a direct effect on demand and delivery of emergency management and disaster resilience services. FEMA will proactively engage and partner with SLTT communities to gain a greater understanding of their climate change adaptation challenges and activities, and look for ways the Department can take action to support them in those efforts. FEMA's leadership on this action will provide the Department with insight for broader engagement across the Homeland Security

Enterprise and a source of best practices for successful collaboration.

**Action 3.04: Establish partnerships with other Agencies and organizations that possess climate science expertise.** DHS and its Components do not maintain in-house climate science expertise. In order to ensure that the information needs of the Department are communicated to the scientific community, and that the Department's adaptation planning is using the best available science, FEMA, with S&T's support, will establish partnerships with scientific Agencies and organizations both within and outside the Federal government.

**Action 3.05: Through partnerships with the climate science community, evaluate the potential impact climate change may have on existing risk data and the corresponding implications for Threat Hazard Identification Risk Assessment development and operational planning.** Changes in the climate will affect the accuracy and practice of using historical records to predict the magnitude, location, and frequency of future hazards—with significant challenges for important analytic processes and decisions. In response, FEMA will continue to work with the climate science and risk analysis community to evaluate the impacts of climate change on the viability of existing risk data. This action will be coordinated with related CCA activities and will provide the Department with insight for further efforts to update risk information and standards across the Homeland Security Enterprise and a source of best practices for successful effective risk management.

**Action 3.06: Evaluate how climate change considerations can be incorporated into grant investment strategies with specific focus on infrastructure and evaluation methodologies or tools such as benefit/cost analysis.** DHS, especially FEMA, provides extensive funding to SLTT entities for the repair and replacement of damaged infrastructure and residential structures after a disaster. Currently, many of these investments are made without purposefully considering future climate conditions, which may reduce their level of resilience to future disasters. FEMA will lead the Department's work to proactively engage and partner with SLTT communities to better understand how climate change may affect their homeland security



Courtesy of FEMA

and emergency management activities and identify ways that the Department can support adaptation efforts through grant investment strategies.

## Operations

**Action 3.07: Promote building standards and practices, both within DHS programs and in general, that consider the future needs of climate change.** The guidelines and standards that FEMA promotes and our SLTT partners utilize to guide construction are based on historical data. As the climate changes, however, future risks to new infrastructure could be higher than currently anticipated. FEMA will lead the Department in initial efforts to encourage the incorporation of future climate considerations into programmatic guidance and standards, where applicable.

**Action 3.08: FEMA will continue to pursue a flexible, scalable, well-equipped, and well-trained workforce that is educated about the potential impacts of climate change.** Changes in the frequency and magnitude of severe weather events could potentially strain DHS resources. Aligned with the Department's broader climate change adaptation education plan, FEMA will continue to assess and improve its staffing and equipment needs to create a more flexible workforce by increasing employee readiness, cross-training staff, and increasing the pool of employees who are qualified and trained to respond to disasters or other events.

## 4. Safety, Stability, Security, and Environmental Protection in the Arctic

**These actions aim to contribute to safety, stability, security, and environmental protection in the Arctic in response to climate change.**

*“As the Nation’s lead Agency for ensuring maritime safety, security, and stewardship, the U.S. Coast Guard will lead our nation’s maritime engagement in the Arctic, and be a leader in advancement of U.S. national interests in the Arctic maritime domain. The U.S. Coast Guard must have the capability to perform the Service’s statutory missions in the demanding Arctic maritime environment to ensure the Arctic remains a safe, secure, and environmentally sustainable region.”*

- The U.S. Coast Guard Arctic Strategic Approach, 2011

For the United States, focus on the changes to the Arctic region is primarily driven by maritime and maritime support adaptations. Due to changes in the physical environment, the Arctic operational and tactical environment has changed dramatically in recent years. The waters of the Arctic are gradually opening up, not only to new resource development, but also to new shipping routes that may reshape the global transport system and affect our national security interests. While these developments offer opportunities for growth, they are potential sources of competition and conflict for access and natural resources.

Greater accessibility and human activity in Arctic waters have increased the significance and national urgency associated with ensuring that the United States has the ability to preserve freedom of navigation, provide safety of life at sea, protect our living and nonliving natural resources, and preserve the natural environment. A national commitment is needed to grow international relationships and agreements, adopt new national policies and capabilities, and build supporting infrastructure in the Arctic region, in a fiscally responsible manner.

DHS will provide a “Whole of Government” approach with respect to adapting to the changing conditions within the Arctic. As the Nation’s lead Agency for ensuring maritime safety, security, and stewardship, the U.S. Coast Guard (USCG) has demonstrated effective leadership for our Nation’s maritime engagement in the Arctic. Using this “Whole of Government” approach, the USCG continues to work with Federal, SLTT, international, and industry partners to prioritize and prepare for increased operational demands within the Arctic region. The 12 actions outlined in this section fully support the National Arctic policy objectives outlined in National Security Presidential Directive-66 / Homeland Security Presidential Directive-25 and are designed to serve as a roadmap to prepare DHS, and the Nation, to address safety, stability, security, and environmental protection concerns in the Arctic.

### Governance, Strategy, and Planning

**Action 4.01: Support national objectives to ensure U.S. sovereignty and freedom of navigation are not infringed.** As Arctic sea ice recedes,

flag and coastal states may assert greater control of Arctic waterways and resources. Such assertions may exceed the limits set by international law and impact the United States’ ability to freely navigate the Arctic and access its resources. The USCG, in coordination with the Department of State, will work with international partners to preserve U.S. interests in the



Courtesy of USGCRP

Arctic.

**Action 4.02: Develop appropriate doctrine and a training program for Arctic operations in the polar environment.** For a number of years the USCG's expertise in high latitude operations has been limited to a small group of service members, but increasing demand may require more personnel and units to operate in the region without the benefit of previous experience. Pending the promulgation of policy and requirements, and identification of adequate resources, the USCG will develop appropriate doctrine and a training program for its Arctic operations in the polar environment.

**Action 4.03: Develop, coordinate, implement, and maintain response and security plans using a "Whole of Government" approach.** The increasingly accessible Arctic presents a new theater for the full spectrum of security risks. The USCG will develop, coordinate, and implement area and regional operational plans to meet national defense contingency planning requirements; prevent and deter, protect, respond to and recover from terrorist attacks, criminal activities, and other hostile acts; and prevent and respond to maritime accidents and natural disasters that pose a serious risk to mariners, passengers, coastal communities, and the environment. FEMA and NPPD will support, as appropriate and within existing authorities.

**Action 4.04: Ensure that economic development in the Arctic region is environmentally sustainable by coordinating the development of an effective Marine Transportation System.** As the Arctic waterways become increas-

ingly accessible, vessel traffic management measures will be needed to reduce transportation risk and promote efficiency. To develop these measures, the USCG will study the waterways and vessel traffic in the Arctic region and Bering Strait, and develop, coordinate, and implement plans to maximize the effectiveness of the Marine Transportation System in the Arctic region.

**Action 4.05: Strengthen institutions for cooperation among the eight Arctic Nations (the United States, Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, and Sweden).** International cooperation will be key to ensuring successful adaptation to the changing Arctic. In support of strengthening international cooperation, the USCG will engage in multilateral and bilateral discussions to better promote U.S. interests in the Arctic, conduct professional exchanges and subject matter expert visits with other nations operating in the Arctic, and work with international stakeholders to leverage existing practices and to build professional relationships.

## Analysis and Decision Support

**Action 4.06: Protect the Arctic environment and conserve its biological resources. Shipping and resource extraction will be major drivers for increased activity in Arctic.** As the lead Federal Agency for maritime pollution prevention and response, USCG must ensure prevention and response capability commensurate with risk, levels of activity, and national standards. USCG will work with partners to assess the future of shipping and resource extraction within the Arctic region and verify and validate environmental models, traditional response equipment performance, and environmental response procedures for use in the Arctic environment.

**Action 4.07: Provide awareness and regular assessment of current and future threats and challenges in the Arctic to support operational missions, planning, and policy development in that area.** The Arctic has not been a region of significant conflict and thus has not been a priority for the intelligence community since the end of the Cold War, but increased traffic and interest in the region should be accompanied with increased attention from the intelligence community. USCG will build upon

previous products to provide timely, accurate, and actionable intelligence regarding trends, threats, and challenges in the Arctic.

**Action 4.08: Analyze the results of the High Latitude Study and associated material to identify capability and support requirements for USCG mission execution in the Arctic.** USCG contracted the High Latitude Study to analyze the Arctic region and applicable authorities, capabilities, capacities, competencies, and partnerships. The results and recommendations of the study and the associated materials will be used to identify changes necessary for USCG mission execution in the Arctic.

**Action 4.09: Enhance scientific monitoring and research into local, regional, and global environmental issues.** There are still many things unknown about climate change and pollution response procedures in the Arctic. Without science exploration, opportunities will be missed to expand the United States' understanding in these areas. USCG will continue to support science research in the Arctic region focusing on science missions, including surveys of the extended continental shelf and environmental research.

## Operations

**Action 4.10: Involve the Arctic's indigenous communities in decisions that affect them.**

There are over 200 federally recognized tribes in Alaska that may be impacted by a changing climate and an increased USCG presence in the region. USCG will develop annual engagement schedules and routinely meet, consult, and engage with indigenous peoples on policy and operational issues in order to enhance working relationships.

**Action 4.11: Meet national security and homeland security needs relevant to the Arctic region.** USCG continues to serve as the lead maritime safety and security agency in the Arctic. The lack of infrastructure, emerging energy exploration, and anticipated increase in maritime traffic poses challenges and requires increased investment in the future to meet emerging operational requirements. USCG will seek appropriate resources to implement and carry out missions in the Arctic region by initiating proposals to build its budget in a manner consistent with anticipated operational and support requirements.

**Action 4.12: Conduct operations, training, and familiarization activities in the Arctic region.** Identifying operational capabilities for USCG response assets and maintaining area familiarization of the Arctic waterways is vital to understanding the service's current operational limitations in the remote region. USCG will annually plan and conduct operations, training, outreach, and familiarization activities in the Arctic region.



Courtesy of USCG

