

Common Themes

Draft Adaptation Options for AAG Consideration – April 3, 2009

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¹ This option was initially developed by Adaptation TWG members as an overarching option for the Subcabinet to address. As it overlaps with CC-6, it has been incorporated here.

Common Theme #1: Establish an Alaska Climate Change Knowledge Center (CCKC)**Recommended Option**

Establish an Alaska Climate Change Knowledge Center (CCKC). The CCKC will provide online access to data, information, and other resources pertinent to understanding climate change and its effects in Alaska. It will provide means to integrate and use the information. It will also provide means to share information on specific geographic areas of concern to Alaskans such as the Arctic.

Option Description**Issue**

Numerous activities are underway to collect data relevant to climate change in Alaska, within state agencies, among Alaskan research institutes, in the private sector, at the federal level, and in international organizations. Some of the existing data are maintained in online archives, others are stored in file cabinets or boxes. There is no easy way to access and integrate many climate change data sets, research, and project information. Additionally, numerous forums, meetings, and events take place that generate information, knowledge, and ideas among the participants. Significant knowledge exists in these contexts, but awareness of its existence is limited and accessing and using the information is challenging and does not facilitate use. Most Alaskan communities and businesses have very little understanding of the recent and projected environmental and ecological changes they are experiencing due to climate change and approaches they could take to adapt. Further, most state and federal agencies responsible for planning and managing both natural resources and built/human capital are not sufficiently informed about climate-change research and predictions to make good decisions regarding strategies to adapt to climate change.

Overview

There is a need to promote both more effective organization of climate change data and information and means to use the information. This requires both technology and data management approaches, as well as coordination and collaboration among agencies, organizations, and entities with data collection and management responsibilities. Current entities with climate change data collection, data management, policy, and/or research responsibilities include:

- Alaska Marine Ecosystem Forum
- State-Federal Climate Change Roundtable
- Alaska Ocean Observing System – AOOS (Alaska Marine Information System for Ocean and Coastal Information)
- Scenarios Network for Alaskan Planning - SNAP
- Alaska Center for Climate Assessment and Policy - ACCAP
- Alaska Climate Research Center - ACRC
- Governor's Sub-Cabinet on Climate Change
- North Pacific Research Board
- National Oceanic and Atmospheric Administration - NOAA

- US Geological Survey - USGS
- Alaska SeaLife Center
- Geographic Information Network of Alaska (GINA) for remote-sensing information
- ...

The CCKC will be supported by staff who organize and coordinate access to existing archives of data on climate change, promote sharing of data and knowledge among experts and those in need of information, provide means to link data, identify gaps in data and information, improve access to data that are currently difficult to locate, and provide access to tools and models that support the use of data accessible in the CCKC. The staff will bring expertise in both technology to support the infrastructure of the CCKC and science to understand the content.

The CCKC will support the online, distributed management of numerous information resources via a Web portal. Resources will include archived climate data, climate projections, maps of climate and Arctic conditions and changes, research on climate change effects, data on current environmental conditions (including data for which archives may not currently exist), policies, forums, workshops, adaptation tools, technical assistance opportunities, etc. The CCKC will not be responsible for new data collection, but will organize and facilitate access to data from existing sources and assist in identifying and prioritizing gaps in data and potential sources of funding to address those gaps.

Users of the CCKC and will likely include scientists, federal, state, and local government agency representatives; the private sector; academics; community members; the media; and non-governmental organizations.

Option Design

Structure

Central to this option will be the establishment of a focal point for organizing and disseminating information relative to the various state, national, and international entities and forums on climate change. It is expected this focal point will consist of staff that perform a coordination function among various data collection efforts and climate change events (e.g., maintain a directory of contacts and calendar) and who develop and maintain an on-line portal to facilitate knowledge sharing. This staff may be established as a state-university funded site, an NGO, within an existing agency, etc. This entity will have several responsibilities including the following:

1. Maintain a comprehensive inventory of organizations and programs collecting data relevant to climate change in Alaska. Establish means to evolve the inventory to ensure currency and the ability to integrate new efforts.
2. Provide access to information about climate change and various geographic regions that exist in current programs, offices, and databases as identified on the first page.
3. Provide access to research papers and references for better understanding impacts of and potential responses to climate change.
4. Provide access to an inventory of successful Alaska-relevant climate-change adaptation programs as well as contact information for the communities, agencies, NGOs, and businesses that developed these. This will enable stakeholder groups to learn quickly from others that have developed successful climate-change adaptation plans.

5. Provide access to data about Arctic forums and individuals participating in them, results of discussions, and decisions. This will aid participants in understanding and tracking Alaska's views and positions on Arctic concerns.
6. Provide a forum to bring together various entities with responsibilities for climate change data collection to provide means to integrate data, conduct analyses. This includes working with NOAA as they explore development of their regional climate partnerships and Climate Services Initiative.
7. Establish means to address questions of users about climate change issues.
8. Identify gaps in data and information and explore and facilitate potential funding sources to address those gaps.
9. Provide on-line forums to encourage knowledge sharing, such as a "chat room" where individuals can pose questions to be addressed by networked experts.
10. Identify areas with a high degree of interest or critical topics where information is lacking and promote means among CCKC stakeholders to interact on these topics.

Targets/Goals

A primary goal of the option is to ensure that investments in Alaska in data and information relative to climate change be leveraged to ensure they serve the communities, businesses, and people of Alaska. This includes understanding existing efforts and providing access to the data they produce.

Targets are as follows:

- Secure funding to conduct a comprehensive inventory of existing efforts, including primary points of contact
- Develop a plan for an approach to organize and coordinate access to relevant climate change data.
- Develop a prototype of a portal/center that would support improved access to the data identified above
- Identify and secure funding for staff to support both technical and scientific aspects of managing and promoting use of climate change data
- Establish a portal/center for accessing climate change and Arctic data and research
- Use the portal to provide technical assistance and strategies that improve the ability to respond to a changing climate and address Arctic issues
- Establish clear measures of performance (e.g., number of users, number of contributors, relevance of information) for the portal to ensure on-going adaptation to potentially changing needs

Timing

Year 1: complete a comprehensive inventory of existing data collection and archival efforts related to climate change and Arctic issues and sources of potential funding and technical assistance for climate-change adaptation.

Year 2: Launch the planning process to identify technical and institutional options for the CCKC, including identification of staffing, partnerships, oversight, funding, and technical infrastructure requirements. Identify funding to implement the plan

Year 3: Implement the plan to establish the CCKC, starting with prototype development. Begin integration and provision of data.

Year 4: Provide technical assistance in the integration and use of climate change data

Years 5 and beyond: Continue to provide online access to and technical assistance in the use of data and information and identify data gaps and potential funding to address the gaps.

Parties Involved (in implementation of this option)

Representatives of the various centers at the University of Alaska, representatives from selected state agencies who are knowledgeable about agency needs and expertise related to climate change, federal agency representatives with responsibilities for collecting data relevant to climate change and Arctic issues (e.g., NOAA, USGS), private sector representatives addressing climate change and Arctic issues, community representatives with knowledge about community needs relative to climate change, and NGOs.

Evaluation

Metrics could be established around effectiveness and utilization of the network; routine user surveys could be conducted.

Research and Data Needs

This option suggests a portal for information and knowledge sharing, so no additional research is anticipated.

Implementation Mechanisms

Upon approval of the Subcabinet of this option, implementation of the Climate Change Knowledge Center will proceed in phases. An initial phase will entail development of an inventory of existing data collection and archive efforts – to identify the potential participants and stakeholders in the CCKC. This will most likely be developed by a consultant/contractor.

Based on identification of interested parties and funding, the second phase will include development of a plan for implementation of the CCKC that explores the possible institutional options for housing and staffing, outlines technical approaches, and identifies potential sources of funding (or works to solicit funding). Options for funding could include contributions to the CCKC from potential stakeholders and partners, including federal agencies such as NOAA; Federal grants, cost recovery (e.g. from industry groups wanting to know about climate factors in designing a new pipeline), and products generated (e.g. climate hazard maps for local governments)

Based on availability of funding, the third phase will be implementation, with the potential for a prototype initially, with further build-out and engagement of new data sources over time. Staff will be required to provide the coordination and management functions, as well as expertise or ability to leverage expertise to conduct analyses and respond to inquiries.

Additional funding will be needed to sustain and evolve the CCKC over time.

Related Policies/Programs and Resources

Related Policies and Programs

This program builds on and integrates the efforts of several entities that address climate change as noted in the Option Description section of this option.

Available Resources

Many entities already have some state funding in place (direct state funding for Subcabinet activities and university funding to SNAP, AOOS, GINA, ACRC, and ACCAP). There is additional federal funding provided by NOAA to AOOS and ACCAP. These funding mechanisms have enabled these entities to develop substantial capacity and expertise but not at a scale or level of coordination sufficient to implement the proposed Center. Funding could come from the federal stimulus package to Alaska.

Feasibility

Feasibility

This program could be implemented immediately if funding is available, because all the pieces are in place and the technical expertise exists to develop an infrastructure. The major hurdle will be institutional – who is the lead, how is the effort best coordinated, who participates, what information is included, how are decisions made, etc. An unresolved issue is how to formalize the State-University-federal and within-University partnership in a way that makes it responsive to state needs but insulates it from short-term political crises and shifts in priorities. NOAA and other federal agencies, NGO, private sector, and community representatives should also be involved.

Constraints

TBD

Adaptation Benefits and Costs

Benefits

This option provides numerous benefits for anyone dealing with climate change issues in AK. It will improve the availability of data for decision-making, will provide approaches to would involve relevant stakeholders in discussions on data relevant to climate change and Arctic issues, and could result in more fruitful and coordinated discussions occurring at the community, state, regional, and federal levels.

Costs (under development)

Possible costs:

1. Phase 1 (Inventory): \$50,000
2. Phase 2 (Plan): \$75,000
3. Phase 3 (Implementation): \$300,000/year (TBD – based on Plan)

TWG Approval and Deliberations

This option was identified by both the Natural Systems and Economic Activities TWGs. It was refined by representatives from each of those TWGs.

Common Theme #2 has been incorporated as a component of one of the options proposed by the Cross-Cutting Issues TWG. See the Appendix in the Option that follows.

Common Theme #2: (CC-6) Create an Alaska Climate Change Program that Coordinates State Efforts for Addressing Climate Change

Policy Description

Responding to climate change and reducing GHG emissions will require a dedicated and coordinated State of Alaska effort with sufficient funding and staff. Better coordination can promote efficiencies and effectiveness in the following areas:

- Coordination and tracking of climate change efforts across State agencies in Alaska;
- Coordination between State of Alaska and other efforts (e.g., federal activities);
- Coordination of the Alaska GHG emissions reporting program and related reporting tools (see CC-1 and CC-4);
- Access to information and education resources (web portal);
- Support of educational materials for students and the public about climate change strategies and impacts; and
- Potential development and drafting of a GHG baseline, goals, priorities, inventories, schedules and performance measures related to mitigating climate change in Alaska.

To achieve the above, a centralized coordinating entity is needed—an Alaska Climate Change Program. It is recommended that the Subcabinet prioritize available staff time and resources to create this entity, including an online presence (e.g., web portal) that represents the State of Alaska climate change activities, including the work of the Subcabinet and Climate Change Strategy that results from its efforts. With a strong coordinating office, resources and funding can be identified and secured to further develop this effort as the voice and face of Alaska’s climate change policies and goals.

Policy Design

Goals

The goals of an Alaska Climate Change Program include the following:

- Develop and draft statutes, regulations, fiscal notes, fee studies, position papers, guidance documents, policies, procedures, and standards as necessary to establish and implement federal and state climate change legislation;
- Provide information on climate change mitigation technology and regulatory guidance to industry and the public;
- Coordinate the GHG emission reporting program and associated inventories (see CC-1);
- Coordinate the Subcabinet’s climate change mitigation policy efforts with the Alaska Energy Plan (see CC-4), the Alaska Municipal League, industry, the Western Climate Initiative and advisory groups and coordinate and track climate change efforts in Alaska;
- Develop partnerships with private citizens, businesses, and local governments;

- Conduct direct outreach on climate change and GHG reduction strategies (see Appendix to CC-6);
- Develop a web portal and a repository of relevant resources and information;
- Support educators to teach students of all levels regarding climate change (see Appendix to CC-6); and
- Provide outreach and education on climate adaptation actions and responses (see Appendix to CC-6).

The following staff within this coordinating program would have responsibility for the above goals:

Staff Member	Overall Goal	Specific Goal
Director Deputy Director Funds Manager	Coordination	<ul style="list-style-type: none"> • Coordinate with Alaska Energy Plan (see CC-4) • Interact with the Western Climate Initiative • Coordinate with Alaska State Agencies for data, outreach and education • Partner with private parties • Coordinate with federal programs
GHG Reporting Program Staff (see CC-1)	Regulation	<ul style="list-style-type: none"> • Develop Climate Change Statutes • Manage GHG Emissions Reporting • Develop Energy Database
Data Manager	Data and Information Management	<ul style="list-style-type: none"> • Organize and provide access to climate change data and information (portal) • Publish GHG Inventory and Forecast • Establish indicators and performance measures
Outreach and Education Coordinator (see Appendix to CC-6)	Outreach and Education	<ul style="list-style-type: none"> • Develop Outreach Materials • Develop Education Materials for School

Figure 1. Roles for Coordinating Program Staff Members

Activities of the Program

- Coordinate and track climate change efforts in Alaska by working with the Governor's office, Subcabinet, Commissioners and state agencies as they develop policy, launch legislative

initiatives, and implement practical and meaningful GHG emission reductions in day-to-day state operations;

- Implement a GHG emission Reporting Program (see CC-1) and coordinate with any carbon cap and trade system;
- Coordinate with the Alaska Energy Authority on development of an Energy Database (see CC-4);
- Develop partnerships with private citizens, businesses, and local governments to gather and share practical strategies to reduce emissions and mitigate climate change;
- Identify and implement “early actions” for State government on climate change (see CC-3);
- Provide access to information by creating and populating a Web Portal dedicated to the Alaska Climate Change Strategy. The Web Portal effort could be supported by a team that includes agency Public Information Officers and Special Assistants for relevant State agencies, along with existing departmental staff who work on climate change issues. The Web Portal will be a repository of relevant resources and information for diverse audiences (e.g., elected officials, media, researchers, the public) and serve as a clearinghouse of climate change information, resources, and education materials. The goal of the web portal is not to replace or replicate existing efforts, but expand information access and assist current efforts with state resources. Examples of information that can be included on the website are:
 - Information on renewable energy, energy efficiency and incentive program in Alaska;
 - Practical and doable strategies—“what you can do”—for private citizens, businesses and industry sectors, and local governments
 - Identification and reporting of the actions that the state government is taking (see CC-3); and
 - Links to the Alaska/Arctic climate change research and monitoring underway by universities, agencies and other groups (see Overarching Option #1).
 - Actions to take to help adapt to a changing climate
- Coordinate technical advisory groups and then process, organize and share their recommendations with state leaders and the public;
- Implement and/or advocate the state’s long-term climate change policy and plan;
- Conduct direct outreach on climate change, GHG reduction strategies, including personal and business strategies, and potential risks from and needed responses to climate change;
- Reach across state and municipal governments, NGOs, the private sector, and citizens to ensure the longevity of the Climate Change Strategy efforts (e.g., Advisory Groups and Technical Working Groups), bring agencies together to coordinate efforts, coordinate outreach and education, and support the ongoing work of the Subcabinet; (see Appendix to CC-6 for further details)
- Identify necessary regulations and work with agencies and the Legislature to enact them;
- Support education of students at all levels and the general public about climate change strategies and impacts and develop education resources and curriculum on climate change for schools and work with the local school districts and state Board of Education to incorporate climate change into science education standards (see Appendix to CC-6 for further details).

Timing and Parties Involved

This coordination effort should be initiated as soon as possible after approval by the Subcabinet of the Alaska Climate Change Strategy. Key to success of the effort will be identifying and maximizing partnerships within State Agencies, and with federal, private and public programs. The Governor and the Governor's Office, OMB, the Climate Change Sub-Cabinet, and representatives of key State Departments, including ADEC, ADFG, ADNR, and DCCED should be involved. In 2009, the Subcabinet should assess current resources and identify lead staff. Resources and staff should be committed by the end of 2009 to address the coordination goals and activities listed above. Many groups will be partners and beneficiaries of this coordinating body:

- Alaska State Legislature
- Alaska Climate Change Strategy Subcabinet
- State Agencies
- Alaska Municipal League
- Tribes
- Alaska Energy Authority
- Federal Agencies
- University of Alaska
- Public
- Alaska Elementary and Secondary Schools
- Industry

Implementation Mechanisms

To establish an Alaska Climate Change Program, the State must promulgate statutes and regulations and allocate funds for the personnel and infrastructure to administer this program. The Subcabinet should submit legislative or budget documentation necessary to procure the resources and authority to charter this coordination and outreach effort. The design of this option assumes that at least a portion of Alaska's future Climate Change Program will be hosted by ADEC because most of the necessary permitting, database, and reporting tools for administering a GHG Reporting Program (see CC-1) are already in place.

Related Programs/Policies in Place

Creating an entity with the mission of tracking climate change and coordinating the State's response will help to ensure the success of the other policies in the Alaska Climate Change Strategy. Staff tasked with this effort can also serve as key liaisons and resources for the private sector if or when the State enacts regulations governing GHG emissions or reporting. The web portal would serve as an information hub to provide outreach for preparing for and responding to climate change, and for efforts to monitor, measure and research climate change.

Many state agencies already have existing staff that deal with climate change issues and outreach. This option would not fund these positions or create new ones within these agencies, but would serve to coordinate and complement these activities.

Key Uncertainties

Several challenges include creating a program using existing resources or securing additional needed funding; identifying an appropriate program lead; developing an approach to presenting information to the public in a way that will be comprehensive and accessible; identifying processes by which the website is maintained and updated; and fostering coordination among the various entities with responsibilities to mitigate and address adaptive actions to climate change.

Benefits

Creating a coordination function to track and coordinate the state's response and resources to climate change can help ensure the continuation and success of the other mitigation policies, and offer an opportunity to leverage and pool resources.

Costs

Costs primarily entail personnel, including salaries and benefits, and contracting costs to develop materials and support a web portal. Figure 2 depicts the costs for the program without the GHG Reporting and Energy Database, which is discussed further in CC-4.

Operating Expenditures	Cost
Program Director	\$100,000
Program Deputy Director	\$95,000
Funds Manager	\$85,000
Data Manager	\$85,000
FTEs for Reporting Program (5) ²	\$425,000
Outreach and Education Coordinator ³	\$85,000
Travel & Equipment	\$100,000
Contracts ⁴	\$400,000
Total	\$1,375,000

Figure 2. Alaska Climate Change Program Estimated Operating Expenditures

² See CC-1 for more detail on costs

³ See Appendix to CC-6 for more detail on costs

⁴ These contracts include the costs for developing the reporting program (CC-1), education materials development and coordination program contracts, but does not include the development of an Energy Database (see CC-1 and CC-4)

Feasibility Issues

Key feasibility issues include identifying a funding source and appropriately coordinating across existing programs. In addition, the effort needs to be flexible and generate sufficient political will to be effective and sustained.

Status of Group Approval

TBD – [until MAG moves to final agreement]

Level of Group Support

TBD – [until MAG moves to final agreement]

Barriers to Consensus

TBD – [undetermined until final vote by the MAG]

CC-6 Appendix: Promote Climate-Change Literacy: An Alaskan Program in Climate-Change Education and Outreach⁵

Recommended Option

Despite the critical and growing importance of climate change to Alaska's residents, there is a generally poor level of public understanding of the causes and consequences of climate change. In order for Alaska to adapt effectively to climate change there is an urgent need to raise the level of literacy about climate change through formal and informal educational pathways and agency outreach to the general public.

The State of Alaska will promote climate-change education and literacy in the state by:

- Identifying climate change as a high-priority subject in the State K-12 Science Standards (both science content and science performance or grade level expectations) and increasing coordination among existing programs and entities that address climate-change education in Alaska's schools; and
- Supporting the development and delivery of effective public outreach materials by state agencies.

Sub-Option 1: Climate Change Education in the Public Schools

Option Description

The State of Alaska will establish a framework through K-12 education to rapidly improve public understanding of the causes and consequences of climate change in Alaska. The State will identify climate change as a high-priority subject in the State K-12 Science Standards, provide an education specialist to focus on science and climate change education, increase coordination among existing programs and entities that address climate-change education in Alaska's schools, and provide training and curricula to teachers to implement the new Science Standards.

⁵ This option was initially developed by Adaptation TWG members as an overarching option for the Subcabinet to address. As it overlaps with CC-6, it has been incorporated here.

By incorporating climate-change education as a formal component of public education, Alaska will provide adequate educational resources to its residents to enable them to make wise choices about how to minimize the costs and maximize the opportunities that result from climate change. In the absence of such education and outreach initiatives, K-12 teachers in schools will not be able to teach about climate change because of the time and subject-matter constraints in their existing curricula. Alaskans are unlikely to take climate change seriously and will not be prepared to adapt to the environmental and ecological changes that are occurring.

Option Design

Structure/design: Sub-option 1 has three major components:

1. The Alaska Department of Education and Early Development (DEED) will identify climate change as a high-priority subject and include it in the State K-12 Science Content and Performance (Grade Level Expectations, GLEs) Standards and provide funding for the rapid development of GLEs, assessment tests, and curricular materials that enable teachers to present this material effectively to students. Climate change curricula can be developed in-house at DEED or could be developed by another entity/entities funded through state contracts and/or competitive grants.

The Science Standards for the State of Alaska were most recently updated in 2005. There is no specific reference in the standards to climate change; climate change content should be added to the frameworks related to life science, earth science, physical science, science and technology; and cultural, social and personal perspectives regarding science. Since students are tested in science proficiency in grades 4, 8 and 10, it will also be necessary to revise assessment tests to measure proficiency with this new climate change content.

The State of Alaska does not have a regular, specified schedule for review and updates to the Standards and GLEs. Revisions to the GLEs typically involve DEED working directly (or through a contractor) with a stakeholder committee (teachers, school districts, public, scientists) to develop new standards. New assessment tests would need to be developed and piloted by the State's assessment contractor. The development of climate change curriculum would likely be accomplished through contract or by the University of Alaska.

2. The state will establish and fund a new environmental/climate change science education specialist at DEED to provide coordination among existing programs and entities that address climate-change education in Alaska's schools, and to coordinate development of the new Science Standards/GLEs. (At present, DEED does not have an environmental science education specialist.)
3. The state will provide funding to the University of Alaska to develop courses for K-12 teachers so these professionals have the training necessary to teach about climate change in Alaska. These courses will involve professionals in education and extension/outreach. It would be important to determine cost effective, yet successful methods for delivery of this training to Alaska's teachers, through distance delivery, training at district in-service sessions, etc.

Targets/goals: The goal of this sub-option is to include climate change as an integral component of public education in Alaska, so Alaska's youth are prepared to make wise choices about adapting to climate change. Targets will include completion of the tasks listed above.

Timing: Implementation for this policy can begin immediately and could be completed within three to four years.

Participants/Parties involved: DEED, US Department of Education, University of Alaska, stakeholders, school districts, teachers, and entities listed in the Related Programs section, below.

Evaluation: Implementation of the adopted policy in classrooms can be monitored and evaluated through formative and summative assessments administered by classroom teachers and/or by DEED, e.g., including climate change in the statewide science test materials.

Research and Data Needs:

- Research public education standards and curricula developed and implemented in other states (e.g., public schools in the State of California).

Implementation Mechanisms

The primary need for implementation of these recommendations is Cabinet-level emphasis, intention, and funding. No additional feasibility studies or research is required. Specific implementation steps are provided in the Option Design section, above.

Related Policies/Programs and Resources

Several organizations that have initiated efforts to integrate climate-change understanding into the educational program include the Center for Ocean Sciences Education, International Arctic Research Center, and the Alaska Sealife Center.

The document on *Climate Literacy: Essential Principles of Climate Science* has been developed by federal science agencies including NOAA and NSF in collaboration with many individuals and the following science and education partners: American Association for the Advancement of Science Project 2061, American Meteorological Society, Association of Science-Technology Centers, College of Exploration, Cooperative Institute for Research in Environmental Sciences, Federation of Earth Science Information Partners, Lawrence Hall of Science, University of California, Berkeley, National Environmental Education Foundation, National Geographic Education Programs, North American Association For Environmental Education, TERC, Inc., GLOBE Program, National Center for Atmospheric Research and University Corporation for Atmospheric Research. This Climate Science Literacy Guide includes science concepts aligned with the National Science Education Standards and the AAAS Benchmarks for Science, and provides a framework for understanding and communicating about climate change and climate science for individuals and communities.

Feasibility

These recommendations could be feasibly implemented within a very reasonable time frame, if funding is appropriated.

Benefits and Costs

Benefits: The primary and essential benefits to this option will be improving the literacy of Alaska's youth (our future adults) in basic information about climate change, mitigation and adaptation, to inform their future decisions regarding their own actions and to ensure that Alaska's population understand the importance in future State decisions and actions.

Costs: Sub-option 1 would involve the following general costs:

Alaska Climate Change Mitigation Advisory Group
www.akclimatechange.us

Center for Climate Strategies
www.climatestrategies.us

- Revision to the State Science Standards / GLEs would require DEED staff time and contractual and logistics costs associated with convening and facilitation of a stakeholder process to review and develop the new standards. There would also be contractual costs to develop and pilot/evaluate new assessment tools to test student proficiency. Development of climate change curricula for K-12 classrooms would require additional contractual funding.
- A new staff position to coordinate climate change education efforts for the DEED would involve hiring an Education Specialist II (approximate cost \$83,000 per year, salary and benefits).
- Development of teacher training materials and accomplishment of teacher training by the University would require contractual funding.

Sub-Option 2: Development and Dissemination of Effective Public Outreach Regarding Climate Change

Option Description

This policy sub-option will support the development and delivery of effective public outreach materials and presentations regarding climate change, by Alaska's state agencies.

Option Design

Structure/design: It is recommended that the State of Alaska:

- Provide funding to state agencies for development and delivery of effective public information materials regarding climate change;⁶ and
- Provide funding to the University of Alaska to develop courses targeted to the state's natural resource managers, so these professionals will have the training necessary to effectively communicate with the public about the effects of climate change in Alaska, mitigation and adaptation.

Targets/goals: The goal of this policy is to improve the content and effectiveness of climate change presentations and materials developed and provided to the public by the state agencies.

Timing: Implementation for this policy can begin immediately. It is recommended that the University of Alaska develop climate-change courses for resource managers within one year and that agencies prepare materials and strategies for public outreach about climate change within two years.

Participants/Parties involved: University of Alaska, State of Alaska resource agencies, federal agencies, non-profit organizations, other scientific institutions.

Evaluation: Community surveys prior to and post education outreach to the general public could be used to evaluate effectiveness.

Research and Data Needs:

⁶ See Ward, B. 2008. *Communicating on Climate Change: An Essential Resource for Journalists, Scientists, and Educators*, Metcalf Institute for Marine and Environmental Reporting.

- Research effective public outreach initiatives and materials developed and distributed by other states, local governments, nonprofit organizations and others.

Implementation Mechanisms

The primary need for implementation of these recommendations is Cabinet-level emphasis, intention, and funding. No additional feasibility studies or research is required.

Related Policies/Programs and Resources

Several organizations that have initiated efforts to integrate climate-change understanding into the educational program include the Center for Ocean Sciences Education, International Arctic Research Center, and the Alaska Sealife Center.

Feasibility

These recommendations could be feasibly implemented within a very reasonable time frame, if funding is appropriated.

Benefits and Costs

Benefits: The primary benefits related to sub-option 2 will be improving the literacy of Alaska's public in basic information about climate change, mitigation and adaptation, to inform their decisions regarding their own actions and to ensure that Alaska's population understands the importance in future State decisions and actions.

Costs: Sub-option 2 would require funding for the University to develop and deliver training for natural agency resource managers in climate change