

Recommendations from Oil and Gas Technical Work Group (O&G TWG) to the State of Alaska Governor's Climate Change Sub-Cabinet - Mitigation Advisory Group

The O&G TWG was tasked with developing recommendations for policies and actions to reduce GHG emissions related to the oil and gas industry in Alaska. Of the 52 MMT gross CO₂e/yr emissions in Alaska, the oil and gas industry produces 15 MMT, 12 MMT of which are from the North Slope, the majority from Prudhoe Bay. Recognizing that, many recommendations focus on the North Slope and Prudhoe Bay, although some of the measures can also be applied to Cook Inlet and other oil and gas operations. Additionally, this TWG was asked to address Carbon Capture and Sequestration (CCS) both within and outside oil and gas facilities.

O&G TWG Principal Recommended Options

- O&G 1: Best Conservation Practices:** Reduces emissions through common-sense measures that minimize fuel consumption. Examples of specific initiatives include reduction in liquid fuel use at O&G operations, fleet turnover to improve efficiency, & idling-reduction programs. Should not require large capital projects or large lead times to accomplish reductions in emissions.
- O&G 2: Reductions in fugitive methane emissions:** Unintentional releases of methane to the atmosphere such as leaks from valves, flanges, unions, tube fittings, & wet seal systems on compressors should be minimized. Priority leaks should be identified for redesign and/or repair. Other than employing Best Conservation Practices, this is the most cost effective option.
- O&G 3: Electrification of oil and gas operations on the North Slope by centralizing power production and distribution:** Through major efficiency increases and resulting reductions in fuel burned, a significant reduction in GHG emitted could be gained, through centralizing power production on the North Slope and electrifying the O&G operations. This option, through incorporating the latest most efficient fuel burning equipment, could reduce GHG emissions on the North Slope by 50%. Obstacles include cost and a complicated regulatory environment.
- O&G 4: Improve efficiencies for oil and gas fuel burning (power generation) equipment:** Replacing inefficient, aging pieces of fuel burning, equipment with newer more efficient ones, a realization of a reduction in amount of fuel burned per unit of work could be achieved, which would significantly reduce GHG emissions. This option could be implemented in stages to best manage the major capital investments that will be needed, and to ensure continued production for the North Slope. Significant improvements in efficiency for gas turbines has occurred, and for each piece of replaced equipment it is possible that these improvements could be as high as 50%, resulting in an overall 18% reduction in GHG's emitted on the North Slope.
- O&G 5: Use renewable energy sources at oil and gas operations where resources permit:** Augmentation of fuel burning energy use on the North Slope by renewable resources (e.g. wind, geothermal on the North Slope, hydro and tidal in the Cook Inlet) would reduce GHG emissions relative to the amount of non-renewable fuel burning energy they replaced. Obstacles include availability/proximity of resource and cost. Further research on renewable options and their operability in cold climates is necessary.
- O&G 6: Carbon Capture and Sequestration (CCS) from high CO₂ fuel gas burned at Prudhoe Bay, use of the CO₂ for enhanced oil recovery (EOR):** 10-12% of the natural gas used for fuel on the North Slope is CO₂. Stripping this before combustion and geologically sequestering the CO₂ could save ~1 MMT/yr in emissions. The CO₂ then has value for increasing ultimate recovery of oil reserves and should be used for EOR to improve economics. Major capital investments in facilities will be needed to capture, transport, and inject the CO₂
- O&G 7: CCS from combustion sources in and near existing oil and gas fields, use of the CO₂ for EOR:** Most emissions from the slope are related to the combustion of natural gas used for fuel. Capture of this CO₂ from the exhaust stream has many similarities but fewer efficiencies than # 6. Each fuel burning facility will need capture facilities installed, but significant gains can be made by focusing on the most concentrated areas of power production, i.e. a centralized gas facility. Additional facilities will be needed for transport and injection. EOR should be utilized to improve economics & maximize ultimate recovery of oil reserves. This is contingent on installation of Centralized Power on NS per Option 3. (otherwise 178 different projects.)
- O&G 8: CCS away from known geologic traps:** Similar to # 7 but deals with capture of CO₂ from diesel or coal burning power generation in interior AK, usually far from O&G facilities or reservoirs. Lack of known storage capacity in the area leads to the need for either a very long CO₂ pipeline or an exploration type program to find a CO₂ storage reservoir.

**Recommendations from
Energy Supply & Demand Technical Work Group (ESD TWG) to the
 State of Alaska
 Governor’s Climate Change Sub-Cabinet - Adaptation Advisory Group**

The ESD TWG was tasked with developing recommendations for policies and actions to reduce Greenhouse Gas emissions from the energy supply and demand sector. This sector encompasses electricity production, transmission and consumption by the end users – residential, commercial and industrial. Policy recommendations are directed towards public utilities, industrial producers such as mines, fish processors and oil and gas exploration and development, and to consumers of energy at all levels.

ESD TWG Principal Recommended Options
<p>ESD 1: Optimize and expand Alaska’s electricity transmission system. This will promote the effective utilization of both traditional and non-traditional electric power resources to offset sources of greenhouse gases. Improving the electrical network will provide for greater efficiencies in power supply, better access to renewable resources, improved coordination between producers and consumers and reduced energy losses.</p>
<p>ESD 2/4/6: Improve Energy efficiency for residential, commercial and industrial customers, and building codes and standards. Demand-side management programs will offer consumer education, energy audits, rebates and incentives, loans and appliance recycling assistance. Adopting and enforcing residential and commercial building codes will ensure reductions in energy consumption for buildings’ light, power and heating needs. This policy also recommends energy audits, loans and grants to upgrade commercial, public and institutional facilities as well as pay-as-you-save loans for residential and commercial customers. The State is encouraged to lead by example and incentives are suggested such as tax credits, permit fee reductions, etc.</p>
<p>ESD 3: Implementation of renewable energy. Renewable energy generation will directly offset use of fossil fuels. This policy will promote establishing an economic and regulatory environment that will allow utilities and individuals to install predictable and reliable capital-intensive renewable energy generation. The goal of this policy is to meet Alaska's renewable energy standard. The costs and benefits of renewable energy projects from those approved as part of AEA Round 1 and 2 projects have been quantified.</p>
<p>ESD 5: Efficiency Improvements for generators. <i>(Captured in Research Needs.)</i></p>
<p>ESD 7: Implementation of small-scale nuclear power. <i>(Captured in Research Needs.)</i></p>
<p>ESD 8: Research and development for cold-climate renewable technologies. <i>(Captured in Research Needs.)</i></p>
<p>ESD 9: Implementation of advanced supply-side technologies. <i>(Captured in Research Needs.)</i></p>

**Recommendations from
Transportation and Land Use Technical Work Group (TLU TWG)
 to the State of Alaska
 Governor’s Climate Change Sub-Cabinet - Adaptation Advisory Group**

The TLU TWG was tasked with developing recommendations for policies and programs to reduce greenhouse gas emissions from Alaska’s transportation sector.

TLU TWG Principal Recommended Options
<p>TLU 1: Public Transit and Ridesharing</p> <ul style="list-style-type: none"> • Expand transit service and make existing service more attractive. • Double transit ridership and ridesharing by 2025.
<p>TLU 2: Heavy-duty Vehicle Idling Reduction</p> <ul style="list-style-type: none"> • Adopt state and local anti-idling regulations. • Promote and expanding the use of technologies that reduce truck and bus idling.
<p>TLU 3: Transportation System Management</p> <ul style="list-style-type: none"> • Improve traffic flow and reduce emissions through strategies such as signal timing, incident management, use of roundabouts, and lower speed limits.
<p>TLU 4: Efficient Development Patterns</p> <ul style="list-style-type: none"> • Encourage new residential and commercial development to occur within the denser parts of urban areas through re-development, infill, and mixed uses that take advance of the existing infrastructure, public services, and facilities.
<p>TLU 5: Alternative Fuel Vehicles</p> <ul style="list-style-type: none"> • Use incentives to promote alternative fuel vehicles (including natural gas and hybrid electric vehicles) among public sector agencies, private sector firms, and consumers.
<p>TLU 6: VMT and GHG Reduction Goals in Planning</p> <ul style="list-style-type: none"> • Evaluate the GHG emissions from state and regional transportation system plans. • Reduce the number and/or length of vehicle trips made in Alaska through planning.
<p>TLU 7: Truck Fuel Efficiency Improvements</p> <ul style="list-style-type: none"> • Improve truck fuel efficiency through participation in Federal EPA Smart Way Program. • Provide incentives to phase out older trucks. • Encourage government agencies to improve efficiency of public transit, school bus and maintenance vehicles.
<p>TLU 8: Marine Vessel Efficiency Improvements</p> <ul style="list-style-type: none"> • Provide financial incentives to accelerate replacement of marine vessel engines.
<p>TLU 9: Aviation Emission Reductions</p> <ul style="list-style-type: none"> • Support the redesign and improvement of the existing air traffic management system. • Encourage adoption of operational best practices to maximize fuel efficiency in aviation sector. • Encourage use of alternative fuels for aviation that are both economically viable and reduce GHG emissions.
<p>TLU 10: Alternative Fuels Research and Development</p> <ul style="list-style-type: none"> • Determine market potential, cost, & GHG impacts of existing alternative fuel and vehicle types in Alaska • Determine methods to encourage the in-state production and use of alternative fuels.

**Preliminary Recommendations from
Forestry, Agriculture and Waste Technical Work Group (FAW TWG)
to the State of Alaska
Governor's Climate Change Sub-Cabinet - Adaptation Advisory Group**

The FAW TWG was tasked with developing policy recommendations to reduce emissions pertaining to the forestry, agriculture and waste sectors.

FAW TWG Principal Recommended Options

FAW 1: Forest Management for Carbon Sequestration

Alaska forests can play a unique role in both preventing and reducing GHG emissions while providing for a wide range of social and environmental benefits. The state has two distinct forest ecosystems, the boreal and coastal forests and the types of forest management activities that may apply to each from a carbon management perspective may also differ. This recommendation promotes additional durable products which can sequester carbon for long periods produced from coastal forests. The higher production levels can occur through enhanced management practices including pre-commercial or commercial thinning treatments. In the boreal forest, the TWG recommends fuel reduction products, the completion of Community Wildfire Protection Plans (CWPP), and reforestation of sites impacted by fire, insect, or disease outbreaks.

FAW 2: Expanded Use of Biomass Feedstocks for Energy Production

Increase the amount of biomass available from forestry, municipal solid waste, and agriculture for generating heat/electricity and liquid/gaseous biofuels to displace the use of fossil energy sources. This requires development of conventional and emerging technologies, as well as methods to economically utilize biomass feedstocks to make alternative fuel products or heat and electricity generation.

FAW 3: Advanced Waste Reduction and Recycling

Reduce waste generation and increase recycling and organics management and in order to limit GHG emissions upstream from material production, through transportation and on the downstream end associated with landfill methane generation. Reduction of generation at the source reduces both landfill emissions and upstream production and transportation emissions. Increase economically-sustainable recycling programs, create new recycling programs, provide incentives for the recycling of construction materials, develop markets for recycled materials, and increase participation and recovery rates for all existing recycling programs.

**Preliminary Recommendations from the
Cross-Cutting Issues Technical Work Group (CC TWG)
 to the State of Alaska
 Governor's Climate Change Sub-Cabinet - Mitigation Advisory Group**

The CC TWG was tasked to develop recommendations for mitigation policies and actions that address cross-cutting issues in Alaska. This TWG reviewed and considered policies related to government lead-by-example actions, outreach, education, GHG inventories and reporting, GHG goals and targets, and financial policies related to climate change.

CC TWG Principal Recommended Options

CC 1: Establish an Alaska Greenhouse Gas Emissions Reporting Program

This option would establish both a mandatory and a voluntary greenhouse gas (GHG) reporting program that ensures publically accessible, accurate, verifiable, and transparent reporting of GHG emissions data using well-documented GHG emissions reporting and verification procedures. The availability of accurate GHG data will support the release of an inventory every 3 years, establishment of an accurate baseline and goals, and opportunity to participate in cap and trade discussions. This option is related to CC-2, CC-4, and CC-6. [On hold pending federal regulation.]

CC 2: Establish Goals for Statewide Greenhouse Gas Emission Reduction

This option recommends that the State of Alaska adopt statewide GHG reduction goals. This goal would be similar to that adopted by the U.S. Climate Action Partnership and by many other states and government industries: begin to reduce GHG emissions by 2012, with reductions up to 10% by 2017, and with an aim to reduce emissions by 60-80% below 1990 levels by 2050. This option also recommends the establishment of an emission baseline against which to measure progress.

CC 3: Identify and Implement State Government Mitigation Actions

This option recommends that the State government "lead by example" with actions that could be implemented immediately, with no or little funding, to reduce GHG emissions. This option recommends specific examples of actions that State agencies could pursue, with an assessment of potential implementation needs, resources, and qualitative measures of GHG savings.

CC 4: Integrate Alaska's Climate Change Strategy with the Alaska Energy Plan

This option recommends that the Alaska Climate Change Strategy and Alaska Energy Plan be integrated over the next few years to ensure that common goals are established (increases in energy production and use are not accompanied by increases in GHG). The option also includes development of an energy database to track both production and use of energy (relates to CC-1).

CC 5: Explore the Various Market-Based Systems to Manage Greenhouse Gas Emissions

This option recommends a commissioned study on various market-based options to manage GHG emissions, such as carbon taxes and carbon cap-and-trade systems. The study would consider these systems in light of Alaska's unique economy.

CC 6: Coordinate Implementation of Alaska's Efforts to Address Climate Change

This option recommends the Alaska's efforts to address climate change continue to be coordinated to ensure synergy among State agency efforts, interaction with federal agencies, and outreach and education.

Recommendations from
Public Infrastructure Technical Work Group (PI TWG)
to the State of Alaska
Governor's Climate Change Sub-Cabinet - Adaptation Advisory Group

The PI TWG was tasked with developing recommendations for policies and actions to protect Alaska's public infrastructure from the effects of a changing climate. Effects that pose primary risk to public infrastructure include increased flooding and erosion, decreased duration and extent of sea ice, increased wind and precipitation, thawing permafrost, increased storm frequency and duration, and increased fire risk. Public infrastructure is defined as the *essential* facilities and utilities under public, cooperative or private ownership that deliver goods and services to communities.

PI TWG Principal Recommended Options

PI 1: Create a Statewide System for Key Data Collection, Analysis, Monitoring and Access

- Establish a coordinated and integrated system to observe, collect, catalog, and disseminate data on the existing condition of public infrastructure and the environmental conditions where it is located.
- Use this information to prepare forecasts and trend analysis yielding up-to-date rates of erosion, permafrost thaw, flooding etcetera by region.
- Next, systematically assess the vulnerability of Alaska's public infrastructure in communities to establish the local level of risk.
- Share information in a useable format with communities to enhance understanding of climate change and the affect on the community, and to facilitate and coordinate project planning and development.

PI 2: Promote Improvements that use Current Best Practices.

- Use current best practices to make infrastructure improvements that are worth doing regardless of climate change's effects.
- This is both critical and practical because we can't stand still while we gather and analyze data and reduce the uncertainties associated with climate change.
- Focus efforts on accomplishing actions that promote sustainability, reduce operating costs, and protect/extend the service life of existing infrastructure.

PI 3: Build to Last; Build Resiliency into Alaska's Public infrastructure.

Build to last by building resiliency into Alaska's public infrastructure by:

- Building in locations outside of hazard zones (that have been updated and defined using climate change modeling),
- Building infrastructure to withstand the expected forces at the location over the life of the infrastructure, or
- Designing and locating public infrastructure to meet acceptable risk limits.

Resiliency will be achieved by:

- Meet or exceed infrastructure design life.
- Optimize life cycle costs/asset management practices.
- Design and build to withstand expected weather events and a changing environment. Use the best science combined with appropriate building codes and engineering standards.

Recommendations from
Health & Culture Technical Work Group (H&C TWG)
 to the State of Alaska Governor's Climate Change Sub-Cabinet - Adaptation
 Advisory Group

Climate change poses risks to the health of all Alaskans, but particularly those living in rural communities with limited public health and health care capacity. Climate change also poses risks to cultural traditions and traditional ways of life. To address these risks, the Health and Culture Technical Working Group identified the following high priority options to increase capacity statewide to avoid, prepare for, and effectively respond to the health and culture risks of climate change in Alaska.

HC TWG Principal Recommended Options

H&C 1: Provide Community Climate Impact Assistance

An array of state, federal and regional entities are responsible for delivering services to Alaskan villages, rural communities, and urban centers, but specific policies and regulatory constraints produce conflicting directives that prevent the coordinated delivery of vital services that will enable endangered villages, traditional culture, and vulnerable communities to adapt in the face of climate change. Therefore, there is a need to establish a coordinating entity with the ability to navigate these multiple bureaucracies and to leverage their resources to support vulnerable communities in emergency response, relocation, subsistence concerns, and other priorities.

H&C 2: Augment surveillance and control programs

Vector-, water-, & foodborne diseases are already on the rise & are likely to become greater threats. Current programs are insufficient to identify & control these changes. Existing infrastructure needs to be augmented to address these emerging concerns to develop new methodologies for surveillance & reporting of human & animal diseases. Improving surveillance will allow more robust tracking and identification of trends to expeditiously & effectively respond to & control emerging public health threats.

H&C 3: Conduct Community Health Impact Evaluations

Actions taken to mitigation GHG emissions or to adapt to current & projected impacts of climate change also may benefit or harm human health. This option proposes a Community Health Impact Evaluation (CHIE) initiative to rapidly & efficiently screen proposed mitigation & adaptation activities to determine whether there may be associated health benefits or harms & to identify additional actions to maximize the benefits & reduce potential adverse impacts. At present, there is no established mechanism for a brief, structured, & rapid professional evaluation of a proposed mitigation or adaptation measure to identify potential adverse or positive influences on health. This option would create a mechanism to identify where health effects were unlikely, minor, few, or more significant. Such an evaluation would facilitate the design & implementation of necessary additional measures, including monitoring, to maximize benefits and to reduce potential likely and significant adverse effects.

H&C 4: Assess risks to rural sanitation and solid waste management

Sanitation & solid waste management is intended to prevent the outbreak of waterborne, vector-borne, & hygienic diseases, limit environmental toxic exposure to humans and wildlife, & improve quality-of-life. Facility & program performance design needs to take into account changing environmental factors upon which they are based. This option would assess needed changes to the capacity of the rural sanitation & solid waste management systems to respond to &/or control anticipated new & exacerbated disease & toxic exposures.

H&C 5: Assess archeological, historical, and cemetery sites at risk from climate change

Alaska's archaeological, historic, & grave sites are becoming increasingly exposed & impacted through anthropogenic and natural processes, including climate change. The objective of this option is to identify, assess, prioritize, & mitigate adverse effects of climate change through development of dedicated program areas within existing state authorities. This will provide for the coordination of efforts to identify, assess, prioritize, and develop mitigation plans to address the effects of climate change, & will enable the State to rapidly respond to threats as necessary. Programs within the state have the authorities, infrastructure, and expertise to coordinate identification, assessment, and mitigation of adverse effects, but do not have adequate staff or funding to perform the duties.

Recommendations from
Natural Systems Technical Work Group (NS TWG)
to the State of Alaska
Governor's Climate Change Sub-Cabinet - Adaptation Advisory Group

The NS TWG was asked to recommend policies and actions the State of Alaska should implement to adapt to climate change effects on Alaska's natural biotic systems and resources, and human uses of those resources. Temperature change and other climate change effects are substantially affecting Alaska's marine, terrestrial and freshwater ecosystems. Alaska must adapt to changes in current species abundance and distribution, changes in access to resources, the arrival of new species, increased threats from fire, pests, and pathogens, and new resource opportunities (e.g., agriculture, fisheries).

NS TWG Principal Recommended Options

NS 1: Incorporate climate change into fisheries management and assist fishing communities and users in adaptation.

Consider climate change impacts in commercial, recreational, subsistence and personal use fisheries policy and management plans, and provide information and technical assistance to fishing communities and user groups to support their adaptation to changes in fisheries.

NS 2: Review and modify wildland fire policies and programs.

Review and modify the State's wildland fire policies and practices in the context of climate change, emphasizing planning, risk reduction and response to increasing fire risk. Enhance local communities' capacity to participate in these efforts.

NS 3: Adaptively manage effects of climate change on freshwater resources through adaptive management, supported by improved hydrologic data.

Obtain additional data regarding surface and groundwater resources (quantity and quality), to support adaptive management. Assess the State's water management laws, policies and practices to ensure the capability to adaptively manage freshwater resources in the context of climate change, including ensuring sufficient instream flow for fish and wildlife habitat. Reestablish the Alaska Water Resources Board to provide a policy body for coordination.

NS 4: Reduce the introduction and spread of invasive species in the context of climate change.

Create the Alaska Invasive Species Council and become an active partner with all levels of government and other entities addressing invasive species. Implement a statewide strategic program for invasive species responsive to climate change effects.

NS 5: Prepare for the adaptive management of fish and wildlife.

Ensure that the State's fish and wildlife management laws, policies and regulatory processes allow for effective and timely adaptation to the effects of climate change on fish and wildlife and on human access to and use of fish and wildlife resources. Develop and use a coordinated framework for monitoring fish and wildlife.

NS 6: Support local sustainable agriculture in Alaska.

Support and expand sustainable agriculture production and marketing in Alaska, recognizing the importance of local agriculture to Alaska's food security. Develop an Alaska food policy and strategic plan to increase reliance on locally produced agricultural products.

NS 7: Promote climate-change literacy through K-12 education.

Develop curriculum and training to support climate change education in grades K-12.

**Recommendations from the
Economic Activities Technical Work Group (EA TWG)
to the State of Alaska
Governor's Climate Change Sub-Cabinet - Adaptation Advisory Group**

The EA TWG was tasked to develop recommendations for adaptation policies and actions to address potential climate change impacts on Alaskan economic activities, including oil and gas, mining, tourism & recreation, ocean transportation, energy demand, and boundaries & ownership issues.

EA TWG Principal Recommended Options

EA 1: Evaluate Capability Needs for Potential Expansion of Arctic Economic Activities

Melting sea ice in the Arctic Ocean could result in increased ship presence & infrastructure requiring increased support for environmental and safety protections. Potential gaps may exist in emergency response & regulatory oversight capabilities. This option recommends that the State recognize & address the potential for increased Arctic economic activities & identify gaps in infrastructure & the ability (federal, state, local, NGOs) to provide an adequate presence in the Arctic coastal region to protect environmental resources, human health, & safety.

EA 2: Develop and Evaluate Scenarios for the Alaskan Economy

Climate change may create economic opportunities in Alaska due to its unique environment & economy as well as the need to address climate impacts earlier than other states. This option recommends conducting & managing a project to develop & evaluate possible economic scenarios for the State, based on potential climate change effects. Both current & potentially new sectors needed to maintain a robust Alaskan economy will be examined. Scenarios will take current variables & conditions as a starting point & examine the effects of changing conditions such as land use, energy use, water availability, regulations, demographics, etc. Future scenarios will examine possible job losses and opportunities in existing sectors & opportunities in new sectors. The scenarios will provide useful information to aid in planning & investment decisions regarding the potential future of the Alaskan economy.

EA 3: Improve Availability of Mapping, Surveying, Charting and Imagery Data

Accurate, timely information about the distribution and magnitude of changes is needed to better address economic challenges & opportunities. A very good baseline of existing conditions is needed, including map imagery, elevation data, bathymetric data, & habitat, landcover, & soils information. Changes in boundaries, especially shorelines, have potential ownership & regulatory implications. High resolution imagery & elevation mapping are required to properly assess changes in permafrost degradation, thermokarst development, glacial melt, streambed changes, coastal erosion, & other dynamic geomorphic processes that can result in economic impacts. This option recommends improving availability of data (specifically real-time mapping, digital elevation model, and imagery data) to improve tracking & understanding of climate change impacts. Intended to build on the work of the Statewide Digital Mapping Initiative, it will also help "stitch" together data at the water-land interface. Accurate bathymetric mapping is also needed to improve quality of navigational charts, leading to safer passage through new northern sea routes.

OVERARCHING OPTION

OA 1: Establish an Alaska Climate Change Knowledge Network (ACCKN)

Background

Numerous activities are underway to collect data relevant to climate change in Alaska. Some of the existing data are maintained in online archives, others stored in file cabinets or boxes. There is no easy way to access and integrate the 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. Awareness of data and knowledge 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.

Recommendation

This option recommends establishing an Alaska Climate Change Knowledge Network (ACCKN) with the following functions:

- Provide means to organize, consolidate where needed, archive, and inventory data and other resources pertinent to understanding climate change and its effects in Alaska.
- Provide online access to the above data, information, and knowledge.
- Provide means to integrate and use the information in response to community needs to understand the effects of climate change.
- Provide means to share information on specific geographic areas of concern such as the Arctic.
- Provide means to incorporate community and other entities' (e.g., the private sector) data, information, and knowledge about the effects of climate change.
- Provide a point of coordination for NOAA efforts to develop a Regional Climate Center in Alaska.

The ACCKN 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 ACCKN. The staff will bring expertise in both technology to support the infrastructure of the ACCKN and science to understand the content. Engaged parties at a minimum will include Alaska Marine Ecosystem Forum, State-Federal Climate Change Roundtable, Alaska Ocean Observing System (AOOS), 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, NOAA, USGS, Alaska SeaLife Center, Geographic Information Network of Alaska (GINA), and the Office of the State Climatologist.