

ALASKA

CLIMATE CHANGE ACTION PLAN RECOMMENDATIONS TO THE GOVERNOR



Prepared by

**Climate Action for
Alaska Leadership Team**

SEPTEMBER 2018





Contents

About the Team	2
Introduction.....	4
Communities and Partnerships	5
Human and Ecosystem Health.....	10
Economic Opportunity	14
Clean Energy.....	18
Outreach and Education	27
Investment.....	32
List of Acronyms.....	36

About the Team

The Climate Action for Alaska Leadership Team was created by Administrative Order 298 on October 31, 2017. The Walker-Mallott Administration tasked the team's 21 members with creating climate change policy recommendations and a recommended climate action plan for Alaska.

Numerous State agencies and departments assisted in the development of the recommended climate policy and recommended action plan, including the Department of Commerce, Community, and Economic Development, the Department of Environmental Conservation, the Department of Fish and Game, the Department of Natural Resources, the Alaska Energy Authority and the University of Alaska, as well as the Secretariat, the Institute of the North.



Ralph Andersen, Dillingham

Ralph Andersen is the President and CEO of Bristol Bay Native Association and a member of Clarks Point Tribal Council. Ralph is also Chairman of the Bristol Bay Partnership and the Western Alaska Salmon Coalition, and is former Co-Chairman of the Alaska Federation of Natives.



Linda Behnken, Sitka

Linda Behnken is the Executive Director of the Alaska Longline Fishermen's Association (ALFA) and has 34 years of experience as a commercial fisherman. Linda is a Commissioner of the International Pacific Halibut Commission and has previously served on the North Pacific Fisheries Management Council.



Lisa Busch, Sitka

Lisa Busch is the Executive Director of the non-profit Sitka Sound Science Center, where she is responsible for operations and organizational development and health. Lisa has prior career experience as a radio producer and environmental journalist, and has worked extensively in providing communication training for scientists.



Luke Hopkins, Fairbanks

Luke Hopkins is former Mayor of the Fairbanks North Star Borough and has previously served on the Borough Assembly and the Board of Directors of the Alaska Municipal League. Luke was a member of the Immediate Action Work Group of the former Sub-Cabinet on Climate Change, where he helped to develop policies to protect coastal communities imminently threatened by climate change.



John Hopson, Jr, Wainwright

John Hopson, Jr. is Mayor of the City of Wainwright, President of the North Slope Borough Assembly, Chairman of the Eskimo Whaling Commission and Vice Chairman of the Voice of the Arctic Inupiat. John has been engaged as both a community and corporate leader on the North Slope for over a decade.



Nicole Kanayurak, Utqiagvik

Nicole Kanayurak is a 2017 Knauss Marine Policy Fellow working in the NOAA Office of International Affairs and Seafood Inspection, focusing on international fisheries legislation and negotiations. Nicole is currently the youth representative to the Inuit Circumpolar Council and former representative to Future Arctic Leaders, and has held a variety of positions working for the North Slope Borough.



Mara Kimmel, Anchorage

Mara Kimmel is the First Lady of Anchorage as well as the city's Resilience Team Lead, and is associate faculty at the Institute of Social and Economic Research at UAA. Mara's doctoral research focuses on the relationship between land rights, governance and human development in Arctic and sub-Arctic communities.



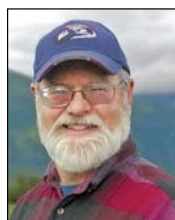
Meera Kohler, Anchorage

Meera Kohler is the President and CEO of Alaska Village Electric Cooperative (AVEC), a non-profit electric utility owned by the residents of 58 communities throughout Alaska. Meera was a member of the former Alaska Climate Change Sub-Cabinet.



Michael LeVine, Juneau

Michael LeVine is the Senior Arctic Fellow at Ocean Conservancy. Michael's work focuses on sustainable management and stewardship of ocean resources, as well as the creation of economic opportunity in the face of changing ocean conditions.



Mark Masteller, Palmer

Mark Masteller is an Assistant Professor at University of Alaska where he teaches classes on energy efficiency and renewable energy as part of the sustainable energy program. Mark serves as the Alaska Director for the Cascadia Green Building Council and as a board member for the Matanuska Electric Association. He has over 20 years of experience in wildlife research and management as a wildlife biologist.



Molly McCammon, Anchorage

Molly McCammon is the Executive Director of the Alaska Ocean Observing System (AOOS). Under her direction, AOOS leads the Alaska Ocean Acidification Network and co-leads the Alaska Harmful Algal Bloom Network and the Alaska Integrated Water Level Observing Network.



Denise Michels, Nome

Denise Michels is a former Mayor of Nome and recently joined DOWL as a Senior Project Manager and will work with Newtok. Previously, while at Kawerak, Denise helped Shishmaref with their relocation efforts. Denise is a former member of the Inuit Circumpolar Council, the Alaska Arctic Council Host Committee, the Northern Waters Task Force, and the Adaptation Advisory Group of the former Sub-Cabinet on Climate Change.



Chris Rose, Anchorage

Chris Rose is the founder and Executive Director of the Renewable Energy Alaska Project (REAP), which is dedicated to increasing renewable energy and energy efficiency throughout Alaska. Chris was a member of the Mitigation Advisory Group of the former Climate Change Sub-Cabinet, and has previously served as the Commissioner of the Mat-Su Borough Planning Commission.



Isaac Vanderburg, Anchorage

Isaac Vanderburg is the Executive Director of Launch Alaska, Alaska's first energy accelerator. Launch Alaska is focused on building companies in the energy sector who are working on climate solutions in the sectors of food, water, energy and transportation.



Janet Weiss, Anchorage

Janet Weiss is the President of BP Alaska Region and has worked in the energy industry for over 30 years, with experience in Alaska, Wyoming and the Gulf of Mexico. Janet is a member of the Alaska Oil and Gas Advisory Board and the University of Alaska Fairbanks Advisory Board.



EX-OFFICIO

Duncan Fields, Kodiak

Duncan Fields is a technical advisor to the Gulf of Alaska Coastal Communities Coalition and the owner of Shoreside Consulting, a natural resources consulting firm based in Kodiak, Alaska. Duncan is an attorney and fisheries advocate, former member of the North Pacific Fisheries Management Council and former president of the Kodiak Island Borough School District.



EX-OFFICIO

Jim Johnsen, Fairbanks

Jim Johnsen is the current President of the University of Alaska, as well as a commissioner on the Denali Commission and a member of the Alaska Aerospace Corporation Board. Jim's many executive roles in higher education have included statewide academic initiatives to align primary and secondary education sectors and to achieve higher attainment levels throughout Alaska.



EX-OFFICIO

Reggie Joule, Kotzebue

Reginald ("Reggie") Joule is a former state legislator in the Alaska House of Representatives and former Mayor of the Northwest Arctic Borough, as well as a member of the UK-based Polar Research and Policy Initiative. While serving as Mayor, Reggie was appointed by President Obama to the President's State, Local and Tribal Leaders Task Force on Climate Preparedness and Resilience.



EX-OFFICIO

Sam Schimmel, St. Lawrence Island

Sam Schimmel is a student and alumni of the Center for Native American Youth (CNAY) Champions for Change Program. Sam has worked on numerous legislative and executive initiatives for Native youth, including a 2016 bill establishing the Alyce Spotted Bear and Walter Soboleff Commission on Native Children and a roundtable discussion with Alaska's congressional delegation and Governor at the 2017 Alaska Federation of Natives.



EX-OFFICIO

Lorali Simon, Palmer

Lorali Simon is the Vice President of External Affairs of Usibelli Coal Mine in Healy, and has over 20 years of experience working in the natural resource management and energy industries. Lorali is a board member of the Resource Development Council and the Alaska Miners Association, and a former member of the Palmer Chamber of Commerce.



EX-OFFICIO

Fran Ulmer, Anchorage

Fran Ulmer is Chair of the U.S. Arctic Research Commission and former Lieutenant Governor of Alaska. Fran is a member of the Global Board of the Nature Conservancy and the Board of the National Parks Conservation Commission, and was appointed to the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling.

Introduction

The Climate Action Leadership Team's (CALT) Climate Change Action Plan is a compilation of numerous ideas drawn from team members, public comment, and the expert and technical panels convened under the CALT's auspices.

This is not a consensus document, though there was broad agreement on many of the recommendations. It does provide potential pathways for the State to consider when implementing the State's climate change strategy. Recommendations should be interpreted not as prescriptive, but as a suite of options to inform agency efforts.

This action plan aims to provide a comprehensive approach that strikes a balance between aspirational goals and feasible implementation.

As a draft submitted to the Governor in September, 2018, the Climate Change Action Plan will continue to elicit public feedback, agency input, and, ultimately administration and legislative decisions.





1 Communities & Partnerships

Strengthen community resilience and sustainability, local and State governance, State agency capacity, and collaboration and action between State agencies and with local and regional entities and municipal and tribal governments.

1.1 Support local and regional entities and municipal and tribal governments in their efforts to plan for and address climate change impacts.

Alaskan communities and stakeholders have identified a significant gap in the State and federal government's capabilities to coordinate responses to climate change. Formalizing a stronger collaboration between the State, local, and regional leaders will help to address this issue. Although the State can play an active role in climate change adaptation efforts, it is important to recognize and encourage maximum local self-government. Local and regional planning efforts must be led at the local level by municipal and tribal governments in cooperation with regional stakeholders and State and federal agencies. State agencies can support, enable, and empower communities in this process. Finally, many communities lack the capacity to fully respond to the effects of climate change, and State and federal resources will be necessary to assist and support community decision-making.

Action 1.1A: Encourage and facilitate a strong network of municipal governments, Alaska Native Tribes, tribal consortia, and Alaska Native Regional and Village Corporations to leverage resources, share knowledge, and maximize efficiencies and purchasing power.

- The State and the Denali Commission should facilitate and enhance networking and sharing.
- The State should evaluate State and federal processes and protocols for contractual and bidding activities, and survey communities, tribes, and municipal governments to identify opportunities for effective (cost-neutral) collaboration and communication.

Action 1.1B: Develop agreements that recognize local and Indigenous rights to self-determination as part of risk and resilience planning and adaptation.

- The State should work with partners to develop a template Memorandum of Understanding for government-to-government agreements between State agencies, tribes, and municipalities. These agreements should clearly respect and support the rights of local governments to develop culturally and place-appropriate climate adaptation strategies, address food security, and identify the role of the State in support of those efforts.
- Alaska's Division of Homeland Security and Emergency Management (DHS&EM) should provide community and regional hazard mitigation plans translated into the first languages of the people who reside in the city or village for which the plan is written.
- Additionally, the State should work with the multiple local governing bodies of small Alaska communities to develop a multijurisdictional hazard mitigation plan, as permitted, if the communities request to develop a single hazard mitigation plan.

Action 1.1C: Increase community capacity to plan for and adapt to climate change through technical support and reducing intergovernmental barriers.

- The Governor should establish a Climate Adaptation Interagency Working Group (CAIWG) to work on providing climate adaptation resources to communities, and serve as a liaison between communities, State agencies, and the federal government.

- The State should work through the CAIWG to establish a data clearinghouse or “knowledge hub” in collaboration with the University and other partners to serve as the central repository for climate adaptation, mitigation, and resiliency resources.
- The State should work with the Alaska congressional delegation to ensure that federal cost-benefit analysis requirements recognize the unique circumstance of Alaskan communities.
- The State should review the statutes and regulations associated with the former Alaska Coastal Zone Management Program to identify best practices and effective collaboration mechanisms.

1.2 Support research and data gathering and engage local and regional entities and municipal and tribal governments in community risk monitoring, assessment, and planning.

A lack of data and a limited ability to gather new data is hindering adaptation and response planning. Vulnerability and risk assessment and resilience planning depend on access to data and the corresponding analyses. To address this, existing programs need to be bolstered; a full inventory of available equipment, programs, and information identified; and community needs identified and prioritized. These programs include ocean, coastal, and riverine observing programs and platforms to track and understand sea level change, erosion, precipitation, ocean acidification, harmful algal blooms, permafrost thaw and other environmental changes, and improved mapping, bathymetry, flood forecasting, and climate modeling.

Funding for environmental monitoring efforts is currently not sufficient to meet known needs, especially those in Western Alaska where land and ocean changes due to climate change are dramatic and year-round data is lacking. In addition to gathering data, it is also necessary to evaluate threats and incorporate effective responses into community risk assessment plans.

Action 1.2A: Support environmental and climate research and monitoring programs in response to prioritized community needs.

- A research network led by the University can support this effort, and include state, federal, and nonprofit partners. The research network should prioritize an action plan to increase understanding of ocean and riverine ecosystems and the changes occurring within them. The research network should ensure State agency participation in these activities and identify funding resources needed to implement the network’s action plans.
- The research network should make recommendations on the potential for using new technologies that can collect environmental data more efficiently and cost effectively.
- The research network should assess the need, requirements, and mechanisms for placing equipment on and using federally funded and operated sites.
- The State should increase support and advocate for federal funding as necessary to increase the availability and utility of data that can be used to inform community decision making.

Action 1.2B: Increase the efficacy and accessibility of vulnerability and risk assessment tools and activities, including their utility for monitoring, evaluating, and prioritizing threats.

- The Alaska Risk Mapping, Assessment and Planning (Risk MAP) Program, a partnership between the State of Alaska and the Federal Emergency Management Agency (FEMA), should be further funded to address data gaps, increase public awareness and understanding of natural hazards, and lead effective engagement in mitigation planning.

- State and federal agency cooperation, in coordination with the Denali Commission and the University, will be essential to delivering useful risk assessment tools.
- The State should consider expanding training and support, including any associated funding for the Local Environmental Observers Network (LEO), to provide significant real-time observation and monitoring of environmental changes.
- The State should create a catalog of existing tools for use by communities, and encourage federal agencies to share their tools and make them appropriate for Alaska conditions.

Action 1.2C: Develop community and regional risk and resilience plans in partnership with local and regional leaders, and encourage strong public engagement.

- The State already has a methodology and system for community risk planning. This process can be strengthened by increasing funding for the Division of Community and Regional Affairs' (DCRA) Alaska Climate Change Impact Mitigation Program (ACCIMP) to provide technical assistance and funding to communities imminently threatened by climate-related natural hazards such as erosion, flooding, storm surge, and thawing permafrost.
- In conjunction with planning at the local level, the State should also conduct its own state-wide risk and resilience planning effort that will be informed by community-led processes. This effort must include identifying priorities and additional investments necessary for under-resourced and at-risk communities.
- The CAIWG should work with the University-led research network to help coordinate research among scientists, and to enable the State and local communities to know who is conducting research and where it is taking place.

1.3 Strengthen existing and further implement effective, efficient systems for community adaptation and relocation.

One of the challenges facing at-risk communities is the lack of a formal federal or State policy on climate change response, especially as it relates to relocation. An interagency approach will be necessary to obtain funding for and implement strategies to coordinate and assist with planning. It is important to recognize that although the State has a role in responding to the effects of climate change, much of the responsibility remains with federal authorities. There is no consistent or overarching federal policy related to the issue; this hinders action in the short term and leads to uncertainty in the long term. The State's role can be augmented with more effective federal policy in place.

The effectiveness of adaptation responses depends on accurate information from both western science and Indigenous Knowledge. Using both knowledge systems produces science-informed, culturally relevant, place-based solutions. Some of the data necessary for adaptation action does exist, and a various organizations can provide a large variety of Alaska and Arctic research data. However, there remain significant data gaps in much of the Interior and Western Alaska, as well as along the Western coast.

Building local capacity is essential for comprehensive climate change response and adaptation. While this is an essential service in many respects, it is also a growth opportunity for the state. Developing the expertise and skillset necessary to respond to the effects of climate change will benefit the future of all Alaskans, and is exportable knowledge as well.

Action 1.3A: Create a policy framework for federal and State agencies' implementation to assist with communities' relocation and adaptation actions.

- The State should develop a strategic plan that implements this process; it should include support for DCRA's community risk planning and the recommendations of the interagency working groups for threatened communities.
- The State should assist communities in advocating for increased federal funding to address this issue. Implementation should be consistent with community-defined priorities and decisions.

Action 1.3B: Collaborate with federal agencies to develop a federal implementation plan, with associated funding in place for threatened and at-risk communities, responsive to local and regional planning.

- The State should advocate for and request the Alaska congressional delegation to secure federal funding for new and existing programs that address and prevent damage resulting from permafrost degradation, loss of sea ice, and coastal and riverine erosion.
- The State should recommend changes to federal programs under the broad authority provided in US Code Title 25 (also known as the Snyder Act of 1924), which covers Indian Affairs, the Bureau of Indian Affairs, Office of Trust Services; and the Tribal Resilience Program, which was created and received appropriations for a Tribal Climate Resiliency Grant Program.
- The State should explore opportunities to enhance the Stafford Act, expanding the definition of "major disaster" in 42 U.S.C. § 5122(2) to include damage resulting from permafrost degradation, loss of sea ice, increased storminess, and coastal and riverine erosion. Changes to the Stafford Act will have national implications and may not result in direct action beneficial to Alaska communities.
- The State should work with the Denali Commission to develop an action plan for threatened and at-risk communities that includes adaptation and relocation strategies.
- The State should share planning tools such as the U.S. Climate Resilience Toolkit and the U.S. Climate Alliance Toolkit. The State should downscale this approach and develop a model Alaska toolkit that helps to share Alaska's story and exports Alaska knowledge.

Action 1.3C: Include Western science and Indigenous Knowledge in adaptation actions.

- A substantial effort should be made to work through a strategy to identify, develop, and improve the processes in place necessary for community adaptation or relocation. The State should employ a coproduction of knowledge approach that incorporates both Western science and Indigenous Knowledge.

Action 1.3D: Create opportunities for training community members to plan for and execute adaptation actions.

- The State should promote local innovation and the development of a regional workforce that can support future companies emerging to meet the climate change challenge. The State can assist by identifying and helping to remove barriers to community-led relocation efforts (including engineering, design, and construction).
- The State's workforce development programs (see Alaska Climate Change Action Plan Statement 5) should include climate change relocation and adaptation.

1.4 Commit to long-term, strategic State leadership on climate change issues, including immediate action, mainstreaming climate change within existing State activities, national and international partnerships, and implementation and continued evaluation of the Climate Action Plan.

The concept of “mainstreaming” climate change action recognizes that climate change intersects with much of the State’s current activities. Existing and new statutes and regulations will have to grapple with climate change effects on State programs, and the ability of these programs to mitigate or help adapt to climate change.

Given the complexity of climate change, the degree to which multiple agencies and levels of government must respond, and to avoid duplication and conflict, the State needs greater capacity for inter- and intragovernmental coordination. Increased intergovernmental coordination should include tribal governments and all federal agencies with intersecting interests, including the Denali Commission.

The effects of climate change will be felt by Alaska’s communities, economy, and environment. The visible consequences of climate change include permafrost degradation, storm surge, coastal and riverine erosion, and species migration. The negative outcomes from these will include fisheries closures, loss of food security, infrastructure loss and degradation, and the need for communities to relocate where protecting in place is not possible.

Action 1.4A: Factor climate change into all intersecting state agency missions, policy, and programs.

- The State should undertake an immediate, comprehensive review of State activities affected by climate change and the statutes and regulations guiding those management decisions, including considerations of the economic, environmental, cultural, and other effects of climate change on their management decisions.
- The State should review the 2009 report of the Immediate Action Working Group (IAWG) of the Climate Change Sub-Cabinet and the former Alaska Coastal Zone Management Program for potential actions and best practices.

Action 1.4B: Formalize a mechanism to prioritize climate change interests, such as the Climate Action Leadership Team, and maintain within the Office of the Governor a focus on intergovernmental cooperation.

- The State should establish something like the former Division of Intergovernmental Coordination; this would be an important step in strengthening climate change communication and collaboration even as it addresses other coordination at the discretion of the Governor.
- The State should encourage continued Climate Action Leadership Team activities.
- The State should name lead climate staff from each agency to report to the Governor’s Senior Advisor on Climate Policy, and to assist in implementing and evaluating the climate change strategy.
- The State should cooperate with federal agencies and advocate for appropriate programs to address research, adaptation, and mitigation efforts, and urge Alaska’s congressional delegation to allocate necessary financial resources.

- The State should also sufficiently fund State and University participation in international climate change forums, including the Arctic Council, the United Nations Intergovernmental Panel on Climate Change, and relevant national and regional cooperative efforts in the U.S., and should consider joining the U.S. Climate Alliance.

Action 1.4C: Include immediate climate action within the mission of the Governor’s Disaster Policy Cabinet.

- The Disaster Policy Cabinet should incorporate climate hazard mitigation and response into its directive and should develop a procedure for State agencies to respond to climate disasters, ensuring the quick deployment of resources after the Governor has issued a disaster declaration.
- The CAIWG should include a subgroup that functions as an Immediate Action Working Group to work with the Disaster Policy Cabinet.
- The State should implement a State-funded hazard mitigation program. This State-funded program would meet the nonfederal cost share requirements of federal mitigation programs (including the FEMA Hazard Mitigation Grant program) to leverage federal funding for projects that reduce the threats and risks of hazards resulting from a warming climate.



2 Human & Ecosystem Health

Work to better understand and address environmental and ecosystem changes, and their effect on human health and well-being.

2.1 Using a coproduction of knowledge approach that integrates western science and Indigenous Knowledge, monitor and gather data needed to better understand the impacts of climate change on the natural environment and identify areas of high vulnerability and risk.

The State actively monitors and is responsible for the health of the environment and living resources. Within State agencies, there is a clear awareness of and concern for the impacts of climate change. Given the scale of the challenge, the capacity of State agencies should be increased.

In some parts of the state, there is existing local research infrastructure to support research and monitoring at the local level. However, this infrastructure is lacking in much of the state; stifled local economies limit research capacity, reducing the availability of local data and hindering informed decision making.

Although the State cannot relocate fish and wildlife affected by climate change in the way that it might be able to for communities, it can work to better understand climate change effects on Alaska’s natural environment and include these factors in management decisions. This is consistent with current agency statutes but adds a layer of focus on climate change. Alaskans will continue to wrestle with food security and subsistence priorities—who has access and what limits to put in place. Agencies that work toward the sustainability of these resources will have to consider the additional challenges and opportunities presented by climate change, and recognize Indigenous rights to self-determination.

Action 2.1A: Support increased State agency ecosystem scale and cumulative impact research.

- The Governor should propose increased funding for agency research and partnerships to provide baseline information on climate change effects on ecosystems, and the cumulative impact of multiple uses on fish stocks. The State can leverage and advocate for increased federal funding, strong University grant applications, and philanthropic funding in support of this effort.

Action 2.1B: Invest in programs that provide critical marine, atmospheric, and terrestrial data, including operations, equipment, and infrastructure.

- The State should identify needs in this area and create and implement a state plan to fund and develop that infrastructure.
- The State should assess its respective data-gathering capacities and develop recommendations for future State investments in data collection.
- The State should advocate for increased, sustained federal funding on behalf of this effort to strengthen Alaska's overall science and research capabilities.

Action 2.1C: Make data available and sharable to assess impacts and monitor the rate of change within marine, freshwater, atmospheric, and terrestrial systems.

- The State should host a statewide data management conference to assess the state of data sharing between government, private sector, and academic researchers and data managers. This conference should develop recommendations about the accessibility of marine, freshwater, and terrestrial data through existing data portals, and the potential utility of a centralized "climate collaboratory."

2.2 Adopt an approach that understands ecosystem and food security health as part of human and community health.

"One Health" is a term used to describe the important interconnectedness between human health, animal health, and environmental health. The Office of the State Veterinarian (OSV) operates within the "One Health" model. This model is a worldwide strategy that recognizes how human, animal, and environmental health are intricately related and seeks to expand interdisciplinary collaborations and communications across these health disciplines. This is demonstrated by the OSV's close working relationship with a number of diverse community, state, and national partners.

Alaska's State and federal waters are home to the nation's largest and most sustainably managed fisheries, including a growing mariculture industry. Recent research has shown that the threats of ocean acidification and rising ocean temperatures is significant to Alaska's economy, local communities, and individual livelihoods. Stopping—or at least slowing—the rate of ocean acidification is critical to Alaska's fisheries, fishing industry, and resource-based economy.

In January 2018, the Department of Health and Social Services (DHSS) published a Health Impact Assessment (HIA) detailing the potential health effects of climate change in Alaska. Per the HIA, potential effects include stress-induced consequences to mental health and well-being; increased rates of accidents and injuries due to extreme weather events; infrastructure damage from thawing permafrost; increased exposure to hazardous materials such as wildfire smoke and mercury; food insecurity; increases in zoonotic, vector-borne, noncommunicable, and chronic diseases; water and sanitation infrastructure damage; and damage to health care infrastructure.

Action 2.2A: Assess climate change impacts to food security and improve approaches and policies that work toward sustainable and locally accessible fish, wildlife, and plant harvests.

- The State should initiate an assessment that considers food security not only from the perspective of subsistence or commercial resources, but also explores a natural disaster elsewhere affecting food shipments to Alaska. This can include climate-related disruptions to the vast web of food systems on which the state depends. As part of the assessment, Alaska should assemble a multidisciplinary team to help guide future decision making.
- The State should consider community input when revising fish and game policies and regulations so that communities can continue to meet their nutritional requirements, economic needs, and cultural well-being with changing seasonality.

Action 2.2B: Collaborate with local, regional, federal, and international partners working on One Health initiatives and integrate leading practices as they apply to climate change impacts.

- The State, in collaboration with partners, should prepare a recommendation for moving forward with a statewide One Health policy.
- The State should prepare a summary of agency work on One Health initiatives, including plans for future collaboration.

Action 2.2C: Continue and increase monitoring and reporting on ocean acidification and its impacts on Alaska's fisheries and coastal/marine ecosystems.

- The State should explore best practices for ocean acidification research with scientists and stakeholders, including strategies for monitoring, species response, and projection of future ocean acidification. Priority should be placed on successful approaches implemented by other regions.
- The State should launch a competition that focuses on innovative solutions to building resilience against ocean acidification.
- The Governor's Mariculture Task Force should encourage and assist aquatic farm operators in the collection of ocean data at farm sites and promote and test technologies and processes that may mitigate ocean acidification in Alaska's coastal waters.

Action 2.2D: Ameliorate the adverse impacts of climate change on the health of individuals and communities.

- The State should acknowledge that rapid changes in climate and environment may result in a range of potential adverse health impacts to Alaskans and our communities, as highlighted in the DHSS HIA.
- Additional research is needed to further characterize and prevent the adverse consequences of a changing climate to the health of Alaskans.
- DHSS should continue to convey the report's findings to stakeholders and continue to be involved in climate change advisory groups, assessments, and adaptation planning efforts to ensure that potential impacts to human health are addressed.

2.3 Develop and implement ecosystem-scale resource management.

Natural resource management decisions should be based on sound science and best practices. Given the complexity and scale of the challenge of climate change, it will become necessary to increase the State's capacity to identify and meet research needs, better incorporate research into decision-making, and work with other levels of government, especially tribal governments and associations.

Alaska's marine and terrestrial ecosystems are already responding to a changing climate—challenging the State's ability to develop, conserve, and maximize the use of Alaska's natural resources consistent with the public interest over decadal scales. Resources that will be directly affected by changing climate include marine and freshwater fishes, shellfish, wild and domesticated plants, timber, and wildlife. Other nonliving resources such as minerals, oil and gas, and water will also be affected by permafrost degradation, changes in temperature or precipitation, and limits to ice road construction. Alaska is a resource extraction state, and a viable economy requires sustainable harvest and access to existing assets. Maintaining a strong resource base requires understanding how to maintain sustainable populations, habitats, and production under evolving conditions. Ecosystem-based management is essential for living resources. For nonliving resources, optimum management will require advances in engineering and science to address consequences of degrading permafrost, limitations in water resources, and increases in such threats as diseases, invasive species, and pests. Advances in engineering and science are essential to enable our state and our residents to better adapt and thrive in these evolving conditions.

Action 2.3A: Conduct baseline studies and monitoring necessary to understand ecosystem process and changes that guide community and state decision-making and risk assessment.

- The State should seek funding for and prioritize baseline studies and monitoring programs in communities and regions most threatened by climate change, ensuring the accessibility of reliable data to inform decision-making.
- The State should expand efforts to connect ongoing and future monitoring to resource management actions, policies, decisions, and vulnerability and risk assessment. State policy should continue to support sustained access and sustainable harvest by Alaska residents to locally available fish, wildlife, and other renewable resources.
- To increase the focus on climate change impacts and commit to reducing greenhouse gas emissions, the State should include a climate change impact assessment in its evaluation of proposed future state and community development. Environmental Impact Statements should include a climate change impact assessment section as well.

Action 2.3B: Strengthen systems for research-informed natural resource and coastal hazard management among state, tribal, local, and federal land and resource managers.

- The State should prepare an analysis of current use of Indigenous Knowledge in natural resource management, including existing collaborative efforts. Based on the analysis, the agencies should prepare and implement a plan to strengthen and replicate what is currently working.
- The State can work with the University and/or other appropriate organizations to host trainings for State employees on existing tools and products that incorporate Indigenous Knowledge.
- The State's land and resource managers should host an annual resource management roundtable attended by experts from tribal and municipal governments; this roundtable should include a review of food production and security.

Action 2.3C: Using a co-production of knowledge approach, develop and implement mechanisms that bridge western science and Indigenous Knowledge to enhance ecosystem awareness, minimize negative impacts, and strengthen resource management.

- The State should convene a working group to define a co-production of knowledge approach that can be implemented across State agencies.
- The State should initiate and participate in conversations about the co-production of knowledge approach at the national and circumpolar scale; sharing Alaska's perspective and inviting outside expertise can present new ideas and options for Alaska.

Action 2.3D: Assess State response options for threatened ecosystems, including reviewing harvest planning or identifying innovative solutions.

- The ADF&G Division of Habitat should prepare and publish an annual summary of threatened ecosystems, including plans for protection and restoration.
- The State should collaborate with other levels of government, such as municipal and Alaska Native Regional and Village Corporation land and resource managers, to ensure an ecosystem approach, to identify disproportionately important areas, and to explore forming local co-management efforts like those that led to creation of the Northern Bering Sea Climate Resilience Area.



3 Economic Opportunity

Invest in, partner with, and encourage private sector diversification, and the growth of Alaska's adaptation and mitigation services, clean energy, and blue economy.

3.1 Support and incentivize energy efficiency, renewable energy, decarbonization, and beneficial electrification across all sectors.

To move towards a resilient economy, characterized by less reliance on fossil fuels for energy, the State must embrace local, clean energy that can power value-added economic development. Diversification in this way will strengthen the State's economy overall and increase opportunities for local residents.

Private sector innovation is increasingly driving economic development in the state. This trend can be supported within priority industries, with incentives in place where clean energy is used. Supporting centers of innovation such as business accelerators and incubators that assist start-ups focused on value-added activities is critical to creating private sector innovation and fomenting entrepreneurship.

Warming oceans and ocean acidification are changing the abundance and distribution of fish and other marine life. Fish species are experiencing a change in habitat distribution, and fishing communities will need affordable in-place opportunities to diversify their economies, develop new fisheries, and launch small-scale mariculture operations. Relocated communities will likewise need in-place economic opportunity. The State of Alaska will need to actively promote access opportunities for community-based fishermen and guide development of Alaska's mariculture industry to meet the needs of coastal residents.

Action 3.1A: Sustainably increase value-added economic activities (e.g., fisheries, transportation, agriculture, mariculture and marine biotechnology, and petrochemicals) that leverage clean energy and maximize in-place opportunity for local residents.

- The State should consider manufacturing processes that use our petroleum resources for petrochemicals and other products that are not used in combustion.
- The State should consider ways to support an ocean “cluster” or other priority area of economic activity that, with increased investment and access to research and resources, is able to leverage individual efforts for larger-sector growth. A focus on diversification and in-place opportunity is necessary as part of a strategic energy transition.
- The State should increase investment loans for alternative energy systems and energy conservation in commercial buildings, fisheries, mariculture, and rural development, and support increased value-added opportunities that have a clean energy component.

Action 3.1B: Develop new carbon-neutral models of community economic development that support diversification, leverage local investment, and strengthen the clean energy economy.

- State and local governments should encourage carbon-neutral economic development within Alaska communities by reprioritizing local investment, local production and consumption of goods (including food and seafood), recycling, and community development processes.
- As applicable, the Department of Administration should add criteria to State Requests for Proposals (RFPs) that gives preference to proposals with clean energy or energy efficiency components. Similarly, municipal government RFPs can give preference to proposals supporting clean energy or energy efficiency.
- State and municipal governments can consider microloans to businesses that focus on carbon-neutral products. This can be done in collaboration with Alaska Native Tribes, tribal consortia, and Alaska Native Regional and Village Corporations.
- The State should increase collaborations for program delivery and the opportunity for public-private partnerships. State and local governments should prioritize ways to make program delivery more efficient and effective, including a review of the opportunity for public-private partnerships and collaborative services.
- The ability to restructure grant, loan, and capital project funding from federal and state budgets to support an energy transition will be important. State and federal funding guidelines will need to remove inefficiencies and barriers that may hinder clean energy use and energy efficiency projects.

Action 3.1C: Promote diversification and local access to fisheries, and develop mariculture at a scale accessible and affordable to coastal residents.

- The State should consider ways to develop mariculture and blue jobs (marine construction, tourism, recreation, transportation, and energy) as an in-place diversification opportunity for small-scale fishermen affected by ocean warming or acidification and communities forced to relocate.
- The State should assess marine climate effects such as warming water, invasive species, ocean acidification, ecosystem changes, and species migration.

- State fisheries management policy should buffer against resource change, create flexibility to respond to evolving conditions, and maximize access opportunity for Alaska coastal residents.

3.2 Support diversification, investment, and established business expertise within the climate change mitigation or adaptation sectors.

The State will need to identify and mitigate economic effects associated with climate change. Economic adaptation is a major component of an energy transition and community adaptation. As part of assessing economic effects, the State should consider potential effects to resource-dependent industries such as fishing and tourism, and devise adaptation mechanisms, including transition plans for any displaced workforce. The State should be able to adjust plans and regulations to account for changing environmental conditions.

Climate change regulations and investments in renewable energy and energy efficiency will affect the State and private sector workforce. A trained and experienced workforce will be essential as climate change goals are advanced. While the workload will increase for permitting and regulatory agencies, and skillsets will need to evolve or be added within industry, this is an opportunity for the State to demonstrate leadership and possibly export that knowledge and know-how to other jurisdictions that are not as far advanced. Early investments in training will help the State implement large permitting and regulatory changes.

Action 3.2A: Consider adaptation processes and technology as an export opportunity, so that Alaskans are able to meet a global demand for climate change adaptation services.

- The State should update its Comprehensive Economic Development Strategy to reflect climate change opportunities and to review existing programs and efforts that export technological expertise, including recommendations for future policy priorities that increase Alaska's knowledge export.
- A multi-organizational effort should develop a new template for community development that is responsive to climate-caused migration, and includes implementing best practices in the areas of rural and urban planning, economics, social science, engineering, building science, and transportation design.

Action 3.2B: Promote and export technological and process innovation related to carbon emission reduction and sequestration.

- The Department of Natural Resources (DNR) should add within its statutes carbon sequestration as one of many multiple uses of state lands, and the Division of Oil and Gas will review best practices, feasibility, and emerging technologies related to carbon capture and storage (CCS). The State passed a carbon sequestration bill many years ago that could be a basis for this action (AS 44.37.200).
- The University should review current research related to CCS and report to the Governor's Senior Advisor for Climate Policy on opportunities for further investigation. An inventory of current capacity within the University to address this issue should be undertaken, and capacity developed.
- The State should promote research related to carbon emission reduction and mitigation at the University and other institutions.

- The State should emphasize and support collaboration between the University system and business accelerators and incubators that is focused on supporting high-growth companies so Alaska can export technologies, processes, and business models related to climate change mitigation and adaptation.
- The State should identify leading global efforts to develop and implement CCS and participate actively in those venues, including convening a workshop in Alaska that invites international experts and develops recommendations for policy, process, and technological advances.

Action 3.2C: Increase and promote growth opportunities in careers that contribute to addressing climate change, including engineering, architecture and design, business, and entrepreneurship.

- The State should support sharing knowledge between organizations addressing climate change mitigation and adaptation. This sharing should include sustainable building practices and career development opportunities in the “climate collaboratory” hosted by the University.
- The University should draw on the existing engineering course catalogue to examine the feasibility of offering a certificate program or minor within the renewable/clean energy sector.
- To promote the opportunities within these industries over the long term, the Department of Education and Early Development (DEED) should emphasize and support K-12 STEM curricula related to energy and climate literacy. The State should also support the amplification of a wide “STEM ecosystem” that does not exist solely within DEED—one that includes utilities, universities, industry, and “maker” and robotic clubs.
- The Department of Labor and Workforce Development (DOL&WD) should reevaluate current clean energy and climate change careers and the potential for increased workforce or new careers, and update their Green Jobs Report to provide career pathways as part of their training programs.
- The State should encourage the University to support student entrepreneurship across disciplines as a way for students to tackle climate-related problems in the community.
- The State should convene a blue ribbon panel of architects, engineers, and designers to discuss changes occurring in the sector, best practices, and how to prepare for an uncertain future.

3.3 Develop a strategic plan for diversified growth within established and emerging economic sectors and consider incentives for value-added business development.

Alaska’s blue economy includes the marine construction, food, tourism, recreation, transportation and energy sectors, as well as commercial fishing and mariculture. The blue economy is expanding due to declining sea ice and new resource development opportunities, even as concerns about environmental protection and food security grow. Several ocean species are also shifting northward. The U.S. and other countries have closed commercial fishing in the Arctic until further scientific baseline studies are completed.

The oil and gas sector, commercial fisheries, and community development play an important role in the blue economy. Barging firms have a major effect on resupplying communities in the summer, and cruise ships provide an economic boost in the summer in some areas of the state. Increasingly the state is seeing small-scale entrepreneurship and innovation in the blue economy, including mariculture and food production.

Alaska is home to the busiest fishing ports in the nation. The growth and innovation in marine electric vehicle (EV) technologies suggest that Alaska will be home to a burgeoning marine EV market in the near future. Staying abreast of these developments, innovating with an eye to the specific needs of the Alaskan fleet, and encouraging investment should be priorities.

Alaska's future economic development will depend on the State's ability to meet the challenges facing the state. The high costs of energy, food, and transportation inhibit economic growth and increase the cost of living and doing business in Alaska. These high costs are opportunities for growth within the innovation and entrepreneurship sector, as Alaskans work toward greater efficiency and lower costs.

Action 3.3A: Conduct a strategic assessment and plan for Alaska's blue economy.

- The Alaska Industrial Development and Export Authority (AIDEA) should play a role in supporting growth within the blue economy, and its mission should be expanded to include maritime or coastal growth as a priority.
- The State should review established and emerging economic activities, assess potential economic performance, and identify priority investments.

Action 3.3B: Develop incentives for innovation and entrepreneurship within the clean energy, food, transportation, and blue economic sectors that lead to local manufacturing, local consumption, and product export.

- Early-stage venture capital investment, or start-up funds, should be directed toward new businesses focused on bringing down high costs and increasing the availability of locally produced goods.
- The State should help to attract outside investment and consider leveraging State assets in combination with existing private capital. Tax incentives or credits may be considered an effective tool to encourage growth in these sectors.
- Transportation accounts for around 25% of Alaska's energy use; developing incentives for efficiencies in transportation would have a positive effect on businesses as well the climate.



4 Clean Energy

Maximize the reduction of greenhouse gas emissions as part of carbon-neutral economic growth.

4.1 Produce by 2020 a comprehensive strategy to decrease greenhouse gas emissions, consistent with and corresponding to the Climate Policy's targets and timelines, and responsive to robust analytics.

Transitioning from an oil and gas economy to a low-carbon economy is a challenging and uncertain process. The State can be committed to change and a clean energy future while also mitigating the negative effects to industry. To accomplish this effectively, a careful analysis will need to consider the effects on various industries, where new regulations will have the most impact, and how to minimize overt disruption of the state economy. These questions are being considered by multiple

oil-producing regions around the world, where the dilemma of potential short-term costs is outweighed by the concern for long-term sustainability. Alaska is not alone in its leadership, nor will change make it less competitive globally.

Incentives and regulations that decrease greenhouse gas emissions will forever change the landscape of energy production in Alaska. Gas resources will become more valuable, which will contribute to the efficacy and opportunity to export Alaska's natural gas. The value of petroleum resources will be consistent with the market, which the Energy Information Administration and others estimate will continue to be strong well into 2050.

Alaska's oil and gas industry is resilient, and is composed of global energy companies that are able to invest in and ensure the longevity of their energy profiles, which include oil and gas as well as renewable resources. The size and quality of Alaska's oil and gas deposits will continue to attract and sustain industry investment, and the State should work with industry to ensure global competitiveness.

The Alaska Affordable Energy Strategy (AkaES) was a comprehensive research and analysis project that produced a suite of recommended policy, regulatory, and funding changes that collectively could improve energy affordability in non-Railbelt communities. The Alaska Energy Authority (AEA) has investigated potential pathways—both infrastructure and noninfrastructure solutions—to long-term energy affordability. A key component of the AkaES was compiling, storing, and analyzing data, and ensuring that it continued to be meaningful to available to stakeholders. This is a resource that can be expanded on alongside other State energy planning documents.

Action 4.1A: Conduct an analysis of sectors that will be impacted by the state's energy transition to a low-carbon future.

- A transition plan should include ways to introduce new technology or regulations in ways that minimize negative impacts. The State should include a market evaluation mechanism in all analyses.
- An energy transition plan will have to consider the State's fiscal policy—accounting for a State budget that is less reliant on oil and gas royalties and taxes and includes new methods for revenue generation that accommodate and respond to clean energy and diversified economy. This will also enable the State to use new budget tools to incentivize or otherwise invest in an active resource development sector that is focused on reducing greenhouse gas emissions.
- The final product, produced by a recognized third party, should include an evaluation of capacity, strengths, gaps, and the appropriate timescale for implementation based on prioritization. The evaluation should include economic modeling of greenhouse gas reduction policies and their impact on multiple sectors.

Action 4.1B: Update past State energy planning efforts.

- The State has conducted many energy planning efforts over the years, including the AkaES, which included data collection, analysis, and modeling. These should be reviewed, and a new version created that includes all areas of the state, supports the climate action strategy, and incorporates a strong stakeholder engagement process—the result of which is time sensitive to economic and societal impact—with mitigation options in place.
- The revised State energy plan should complement, help inform, and stand alongside the energy transition plan, while focusing on community level activities. The AEA should lead this effort. Increasing their capacity and authority will be necessary to implement the project effectively.

- Additionally, the analysis and modeling should help inform state policy, incorporate market-based solutions, and be flexible enough to provide benchmarks for technological innovation.

Action 4.1C: Develop Alaska's natural gas resources as a bridge fuel for export and for domestic use, to increase affordability and energy security, and to move communities and industry from higher to lower carbon intensity.

- Alaska's natural gas resources, especially the Alaska liquefied natural gas (LNG) project, offer a significant opportunity to increase the in-state use of natural gas and decrease the use of high-carbon fuels in larger markets. Alaska LNG includes several offtake locations that enable the delivery of North Slope natural gas to communities along the pipeline, providing a direct opportunity for these communities to reduce their greenhouse gas emissions via fuel substitution.
- As part of the integration of natural gas into the state's energy system, appliances should be replaced with more energy-efficient equipment alternatives such as heat pumps. A State program should be established to support this transition.
- The State should provide legislation to support additional funding for AIDEA's Sustainable Energy Transmission and Supply loan program, as well as a clear directive for the types of projects and outcomes the legislature intends this loan program to support. This program was only used once for the now-established Interior Energy Project.

Action 4.1D: Require medium- and large-sized emitters to report greenhouse gas emissions to the State and municipalities, and establish the baseline for and increase monitoring of emissions.

- The State should increase the resources available to conduct the Department of Environmental Conservation (DEC) Greenhouse Gas Emissions Inventory, which is essential to tracking progress on the climate change strategy.
- At the local level, increased data acquisition and sharing is essential to community planning. The State should encourage, support, or otherwise work with communities to secure greenhouse gas emission data from local emitters. This data is essential not only for climate change efforts, but also for energy efficiency programs and transportation planning.

4.2 Reduce oil, gas, and mining industry greenhouse gas emissions in Alaska by 30% (over 2005 levels) by 2030, responsive to advances in available technology, policy, funding, and economic impacts.

Alaska's industrial sector produces approximately 57% of gross greenhouse gas emissions in Alaska on an annual basis (2015 data). The biggest difference in overall state emissions must begin with the largest emitter. The State should set a target to reduce emissions from this sector by 30%, which is consistent with the 2015 United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement. Any target should be Alaska-specific and account for Alaska's unique circumstances, with cognizance of national or global targets. At the same time, Alaska's economy and State budget depend on the competitiveness of this sector. Any approach to decreasing emissions within the oil and gas industry should account for the associated economic impact and mitigate negative financial impacts to the greatest extent possible.

Fugitive methane contributed over 19% of the carbon dioxide equivalent (CO₂e) emitted by this sector in 2015. Most of the fugitive methane comes from oil production; a small portion comes from natural gas production. Fugitive emissions are released from pressurized systems (e.g., internal combustion engines) during industrial operations.

Action 4.2A: Consider mechanisms to ensure that oil and gas development is conducted more efficiently and with decreased emissions, and with continued private investment.

- Although DEC, DNR, and the Alaska Oil and Gas Conservation Commission (AOGCC) continue to work together to identify best practices for reducing emissions, potential solutions include facility upgrades and changes in facility operations. The State should conduct a global review of technological and process innovation that has resulted in cost-effective reductions in emissions. The State should consider ways to incentivize industry action, both through regulatory changes and/or financial incentives.
- Location and field life have significant economic effects on technology-based options, and the State should continue to work with the oil and gas industry to improve North Slope and Cook Inlet operations to help meet climate change goals. As part of this process, the State will need to evaluate whether greenhouse gas-limiting technologies complicate or erode the effectiveness of other technologies (e.g.; more energy-efficient turbines and fuel gas CO₂ removal would likely require double investment in both carbon and criteria pollutant reduction systems).
- Operational changes or retrofits may be expensive, and the State should consider mitigation efforts to decrease the negative effect on the state's economy. The State can reduce the technological and regulatory costs of implementing potential options and increase the benefits from carbon sequestration.
- The State can take a leadership role in increasing the effectiveness and efficiency of its regulatory authority, even as it advocates for federal regulatory change. However, it is not feasible to wait for federal change; in the meantime, the State can ensure that its policy and regulatory system is doing its utmost to support the State's climate change goals and economic development.

Action 4.2B: Consider the development of a high-efficiency central power plant at Prudhoe Bay, interconnectedness between oil fields, and a new Ultra Low Sulfur (ULS) oil refining operation plant.

- Significant emissions reductions could occur by building a large, high-efficiency central power plant that could service multiple fields and nearby communities. In order to increase the feasibility of this effort, the State would have to amend its approach to royalty payments for gas used to generate electricity that crosses unit boundaries, work with industry partners on the regulations necessary to create a public utility, and collaborate with federal agencies.
- The State should consider the development of a ULS oil refining operation plant in order to reduce transportation emissions.
- Industry should work with the Alaska Center for Energy and Power to design an effective and highly efficient North Slope utility operation that combines consideration of renewable energy integration with system efficiency. Large-scale generation at the North Slope could be exported to the rest of the state and beyond via high-capacity transmission, using both direct current and alternating current systems as appropriate.

- DNR and industry representatives should consult with the North Slope Borough, Alaska Native Tribes, tribal consortia, and Alaska Native Regional and Village Corporations to identify mutual benefit to communities and shareholders, as well as project proponents.

Action 4.2C: Identify ways to reduce fugitive emissions and increase carbon capture, use, storage, and sequestration.

- AOGCC should conduct a thorough inspection of North Slope and Cook Inlet oil production facilities to identify current sources of fugitive methane and make recommendations to address these.
- For carbon capture projects deriving value from enhanced oil recovery (EOR), the oil and gas industry should work with State regulators to conduct a technical analysis to choose appropriate carbon capture technology and the best reservoir for carbon-injection to maximize economics.
- For carbon capture projects away from known geologic traps, the State and industry should form a working group to conduct a technical analysis of size and type of facility modifications and the choice of appropriate carbon capture technology, and search for nearby sequestration opportunities or plan for a pipeline to known reservoirs with proven seals. The State should be cognizant of the fact that CCS requires more energy, and that a preferred approach is to focus on efficiency—minimizing the amount of carbon to be captured, then treating a smaller volume of exhaust gases.
- The State should negotiate with existing leaseholders to determine the feasibility of and/or industry mitigation measures for carbon capture and storage and consider requiring this information in future lease agreements.

Action 4.2D: Set a target of renewable energy that should be included in new oil, gas, mining, and industrial projects.

- Renewable energy goals should be established as part of the leasing process, and within Environmental Impact Statements as part of mitigation measures.
- Renewable energy goals could be achieved by holding the oil, gas, and mining industries that self-generate—or plan to self-generate—their energy to the same renewable energy requirements contained in any renewable portfolio standard (RPS) that the State may establish.
- The State should encourage the oil and gas sector to make use of existing renewable energy funding through AEA or other agencies.

Action 4.2E: Incorporate greenhouse gas emission assessment into proposed development on state, borough, tribal, and municipal lands to evaluate project impact on achieving Alaska's climate and carbon-neutral goals.

- Similar to the HIA, a Climate Impact Assessment should be incorporated into a project's Environmental Impact Statement. The Climate Impact Assessment should include greenhouse gas emissions associated with both development and ongoing contribution through use (e.g., road building that increases vehicle traffic), and should also include mitigation, alternatives, and a cost-benefit analysis.
- As part of this process, the State should identify research gaps, including tools that value land, forest, wetlands, and water carbon sequestration.

4.3 Decrease greenhouse gas emissions due to thermal energy used in buildings by 5.5% (over 2010 levels) by 2030 and increase demand-side energy efficiency within the residential and nonresidential sectors, with consideration of higher goals dependent on advances in technology, policy, or funding.

Action 4.3A: Establish a statewide residential building and energy efficiency code for new residential construction.

- The State should submit and/or review proposed state residential building construction codes and methods that incorporate low energy use standards for new construction. Additionally, the State should submit and/or review residential retrofit energy standards, using the Alaska Housing Finance Corporation (AHFC) Home Energy Rebate Program energy standards as a guide.
- A State working group of relevant agencies should evaluate the potential for and effectiveness of such a code and a pathway for implementation.
- As part of this effort, the State should update design and engineering standards to incorporate expected climate change impacts, with life cycle and energy efficiency priorities.

Action 4.3B: Establish programs to finance and support energy efficiency retrofits for residential, commercial, and public buildings.

- The State should increase funding for home energy efficiency programs, which have been shown to reduce energy consumption up to 33% annually in many Alaskan homes.
- Programs to finance and support energy efficiency retrofits for residential, commercial, and public buildings should be developed under the auspices of a “green bank.” Green banks are public finance authorities that use limited public dollars to leverage greater private investment in clean energy.
- The State should develop a wider application of the new Commercial Property Assessed Clean Energy (C-PACE) legislation through additional amendments to current state laws. Under a C-PACE program, commercial building owners are able to borrow money from their local property tax authority and then pay the municipality back through a special tax assessment on the building.

Action 4.3C: Implement a standard by 2030 of net-zero energy construction for new public buildings, and energy efficiency requirements for state-financed buildings.

- A standard for the construction of new energy net-zero public buildings should be established well before 2030, but a phased approach of implementation by 2030 would give the architecture and engineering community time to implement it. The State should consider a geographic approach and feasibility review to determine where this is practical. Achieving net-zero is challenging in Alaska, and this could be considered within AIDEA financing considerations. The State should apply aggressive energy efficiency standards when net-zero is not feasible.

4.4 Decrease greenhouse gas emissions within electricity generation by 33% (over 2010 levels) by 2030, and increase renewable energy, with consideration of higher goals dependent on advances in technology, policy, or funding.

In 2010, the Alaska legislature established a goal to have 50% of electricity generated in the state come from renewable energy sources by 2025. The percentage of electrical needs met by renewable generation has increased from 22.4% in 2010 to 30.2% in 2016. Of the renewable generation, about 90% is produced by hydropower and 10% by wind power. Because so much renewable generation comes from hydropower, there are year-to-year fluctuations in overall renewable contribution based on weather. In years with little snow and low precipitation, the state may see a decrease in total renewable generation with no change in installed capacity. The only large renewable project currently slated for near-term construction is the expansion of the Bradley Lake hydro facility on the Railbelt. If the expansion had been operational in 2016 it would have added less than 1% to total statewide renewable generation. At the current rate of increase of renewable generation, it would take more than 100 years to achieve the 50% goal set in 2010. Changes in current policy will need to be made to achieve this goal.

Also in 2010, the legislature established a goal to have a 15% increase in per capita demand-side energy efficiency by 2020. Based on current progress and trends, AEA expects that the state will have a 5% increase in per capita energy efficiency by 2020, using 2010 as the baseline year. State programs such as the Home Energy Rebate, Weatherization, and New Home Rebate program have helped to increase the energy efficiency of nearly 40,000 existing or new residential buildings (out of a building stock of 280,000), although much of the money for these programs was appropriated prior to 2010. The majority of Alaska's increase in energy efficiency has come from reductions in the electricity consumption, primarily through improvements to consumer technology and behavior changes occurring largely outside of the state's involvement. At the current rate of improvement and funding levels, the state would expect to reach the 15% goal (2010 goal) around 2045.

In rural communities, improving the efficiency of power generation through optimized diesel generation maintenance and reduced line loss also contributes to a decrease in greenhouse gas emissions. Between 2000 and 2014, there were abundant grant funds available to assist in maintaining that infrastructure—most of them federal—primarily through the Rural Power System Upgrade (RPSU) and Bulk Fuel Upgrade (BFU) programs managed by AEA. In recent years, there has been a precipitous decline in the availability of funding, although the need for maintaining that infrastructure has remained constant. The resulting difference in need versus ability to meet that need requires a shift in the way projects have historically been selected and funded; new emphasis should be on optimizing the economic life of infrastructure as well as ensuring that is efficient, safe, reliable, and affordable to the greatest extent possible.

There are close to 200 isolated power systems in rural Alaska. Most of them rely exclusively on diesel. Some of them have integrated renewable energy. Regardless of their makeup, each of these systems requires ongoing and careful maintenance and operations, appropriately trained and locally available staff, and various administrative requirements (sending inspection logs, having a maintenance contact, etc.). Similarly, within the Railbelt region there is an opportunity for reducing emissions through administrative and operational efficiencies by electric utilities.

Action 4.4A: Implement a Renewable Energy Portfolio Standard (RPS) and Energy Efficiency Resource Standard (EERS).

- A Renewable Portfolio Standard (RPS) for Alaska is feasible and should include other structural reforms. The RPS would include hydropower; milestones for utilities and industry should be set and accelerate over time.
- A full impact analysis of a RPS and/or an Energy Efficiency Resource Standard (EERS) has never been done for Alaska and should be a prerequisite to any implementation. EERS and RPS policies are best practices that have successfully met consumer demand using energy efficiency and renewable energy across state lines in other parts of the country. Most EERSs and RPSs are structured to protect the financial interests of both the utility and its customers. The State would not want a policy that set requirements without reasonable utility cost test guidelines. However, policy makers, in considering the full impacts and costs of climate change, should require that these cost tests consider the full cost of nonrenewable/efficiency sources power (e.g., carbon cost).

Action 4.4B: Improve electric generation efficiency in the Railbelt through a regionwide system operator and economic dispatch.

- The State should endorse the formation of a regional system operator for the Railbelt. The regional system operator would enforce regional reliability and interconnection standards. Those standards could be developed voluntarily or by the RCA. Interconnection standards should ensure nondiscriminatory access to the grid.
- A regional transmission utility should be formed to make investments in the grid infrastructure. Perhaps most important for the long term, the Railbelt utilities should consider regional and enforceable integrated resource planning for both new transmission and generation. This planning regime should be consistent with other State energy policies and goals (like an RPS).

Action 4.4C: Improve electric generation efficiency in rural Alaska through optimized power generation maintenance, improved renewable integration strategies, and reduced line loss.

- To optimize the diesel maintenance of existing and future generation infrastructure (a key to efficient and long-term use), AEA's Circuit Rider program should be integrated with utility financial and operations management training (as is being piloted by AEA) to ensure that the utility operator and manager collaborate effectively to meet customer needs for safe, reliable, and affordable energy. The program should also provide utilities with training on how to diagnose line loss issues and recommend potential resources for reducing losses.
- Many of the State and federal programs that supported improving community power production and increasing renewable energy have been curtailed due to budget cuts and shifting priorities. In order to meet its climate goals, the State should consider investing more in these programs (which include AEA's RPSU and BFU programs), and altering program structures to encourage maximum value from dollars spent. Proposed changes to the RPSU program should include an increased use of debt financing to both extend the State's capital funds and provide increased natural incentives for optimum operation. Debt financing, particularly through AEA's Power Project Loan fund, would allow for greater requirements and a longer-term relationship with the utility than is commonly had through a grant. In selecting a project in a community, the RPSU program should weigh all reasonable energy sources—fossil fuels and renewables—to serve the community's needs.

- Additionally, the Renewable Energy Fund and the Emerging Energy Technology Fund should be invested in at levels that help the State meet its goals, with emerging energy technology focused on helping to meet reduced carbon emission goals, including within the oil and gas industry. More robust project financing tools, including consideration of a Community Energy Fund for Alaska, should be considered.
- Bulk fuel upgrades, provided by AEA and the Denali Commission, have been beneficial across rural Alaska, and this program will remain a critical part of the safe, reliable, and affordable energy solutions portfolio for rural communities. However, increased investment and guidelines that focus on efficiency and the ability to integrate renewable energy into remote, rural power systems are also necessary.
- Finally, to improve efficiency, the State should evaluate the opportunity to align state programs that finance and support electricity generation in rural Alaska with an aim to accelerate the use and integration of renewable resources where appropriate. AEA should be the lead in this effort; its capacity and authority should be expanded such that it can carry out an effective implementation plan.

4.5 Increase the efficiency of and reduce carbon emissions in air, rail, road, and marine operations and transportation, and promote the use of more efficient and lower-emitting fuels.

The transportation sector is Alaska's second greatest source of greenhouse gas emissions.

Action 4.5A: Prepare for and promote a rapid transition to electric vehicles (EV) and lower-carbon fuels for transportation; this includes providing the requisite EV charging infrastructure, as well as shared bulk purchasing of EVs.

- The State should prepare for and promote a rapid transition to electric passenger vehicles; this includes providing the requisite EV charging infrastructure throughout Alaska and within communities. The EV charging infrastructure on Alaska's primary road systems will require cooperation among local governments and utilities.
- The Department of Transportation and Public Facilities should assess the efficiency of the State vehicle fleet and research and implement efficiency improvements as they are feasible and encourage shared purchasing by political subdivisions of the State.
- The State should establish a phased approach to transitioning the vast majority of state vehicles to EV by 2030. The State should explore energy efficient lighting for roadways and conduct a review of energy efficiency of state-owned ferries.
- The State should encourage or establish programs to research, finance, and support commercial fishing vessel energy efficiency retrofits, modifications, and repower.
- The State should promote the use of more efficient and lower-emitting fuels in existing air, rail, and marine transportation sectors, including evaluating the proposed ban on using heavy fuel oil in Arctic waters.

Action 4.5B: Promote public transportation between and within Girdwood, Anchorage, Fairbanks, Juneau, and the Matanuska-Susitna Valley, including the potential for commuter rail and use of the existing rail lines and stations.

- The State should produce a transit plan for the Railbelt. Much of the capital infrastructure required for commuter rail is already built, including the railroad tracks. Further capital infrastructure can be supported through federal transportation grants.
- Finally, the State should encourage the use of and investment in more nonmotorized transportation routes (e.g., bike and pedestrian paths) as a way to encourage reduction of carbon emissions.



5 Outreach & Education

Expand climate and environmental science, natural resource, and energy education, awareness, and workforce development.

5.1 Increase public awareness of climate change impacts and opportunities, and human and environmental vulnerability.

The State's leadership in addressing climate change adaptation, response, and mitigation is an important story to share across the nation and globe. Alaska's climate change strategy is a comprehensive, responsive, and evolving effort that highlights both Alaska's unique position in the Arctic, and the impacts felt by Alaskan businesses and communities. Sharing the State's story will attract financial and human resources and promote the exchange of best practices and knowledge with strategic partners.

Action 5.1A: Maintain an energy literacy campaign to increase awareness of the impacts and opportunities of climate change and carbon reduction.

- The State should partner with scientists and University partners to develop a climate science, resource, and energy literacy program for journalists and TV weather newscasters.
- Many rural Alaskan communities are the recipients of renewable energy systems, yet lack an energy literacy framework to appreciate how these systems are benefiting the community. A "K-Gray" approach to energy literacy that is specific to installed projects should be prioritized to ensure the proper maintenance of costly renewable systems and simultaneously spur curiosity and encourage a pipeline of future energy champions.

Action 5.1B: Support and provide resources for community awareness events related to energy literacy, and climate change impacts, responses, and opportunities in both rural and urban communities.

- The State should encourage private, academic, and nonprofit sector science communication of climate change. The State should partner with local governments, museums, and nonprofit organizations to engage the public in dialogue and reviews of research and government action.

- The State should increase general energy literacy among all Alaskans to help communities understand the impacts of current energy use and the opportunities available in the transition to clean energy systems.
- The State should be involved in public awareness efforts that, like the K-12 STEM initiative, are intended to bridge the gap in public understanding of natural science, resource management, and environmental change.
- The State should build awareness of and promote its climate change objectives by calling attention to renewable energy and energy efficiency goals and identifying actions that the public can take, such as increased use of nonmotorized and low-carbon transportation methods. This can include support of safety corridors for pedestrians and bicyclists along major roadways and within municipalities, and support for nonprofits developing bike trails such as Bike Anchorage.

Action 5.1C: Encourage and support Alaska's field stations and museums to conduct, coordinate, and share climate change research with each other, the public, University researchers, and state managers.

- Field stations and museums in Alaska are important resources for taking climate change action. Both provide an invaluable service to local communities and the State by providing unbiased scientific information and facilities to help governmental and other stakeholders tackle critical environmental issues. Field station, museum staff, and researchers often play a critical role in ensuring that environmental considerations are factored into local and regional planning and development decisions. Additionally, field stations and museums offer wonderful opportunities for engagement in science and climate change education, and they have a unique ability to communicate research findings.

5.2 Increase the use and efficacy of science, natural resource, and energy curricula.

Complex and global issues such as climate change require a strong understanding of natural science, resource management, and environmental change. The best way to address this is by increasing educational attainment in Alaska and increasing student proficiency in math, technology, engineering, and science. Because of Alaska's land and resource endowment, it is additionally important to include a focus on natural resource and environmental science, which will ground future Alaskans in the sustainable management, development, and conservation of renewable and nonrenewable resources. A critical and firm understanding of energy issues, both for export and domestic use, and the ways Alaskans power and heat their homes or run their businesses, is especially important in a state with current high costs of energy and a dependence on oil and gas revenue.

Ultimately, what is taught in the classroom depends on the quality of the state's teachers and the resources they have at hand, and decisions made by local school boards. The State and its partners can encourage local school boards to consider increasing natural resource, climate change and environmental science curricula. Local control and local decision-making will be an important element in establishing what should be taught to help students make informed decisions about the world they live in and the future they will inherit.

Action 5.2A: Implement and support the required structural components that have been identified in the existing Natural Resource and Environmental Literacy Plan.

- The State should create and support an active statewide Natural Resource and Environmental Literacy Leadership Council composed of professionals from school districts, natural resource agencies and industries, tribal organizations and Native corporations, educational nonprofit organizations, and outdoor recreation organizations.
- The State should create and support school or school district liaisons to help integrate the plan at the local level, a coordinator who has the resources and flexibility necessary to provide assistance in plan implementation, and periodic review of existing or potential curriculum.
- The State can work with partners to deliver these programs. For instance, the state in the past has supported the work of the Alaska Resource Education, which has been working to increase natural resource education since the 1980s.

Action 5.2B: Increase teacher support, training, and curriculum implementation emphasizing environmental science, STEM, and climate change impacts.

- The State should support and promote summer teacher trainings linked with existing natural resource, climate change, and environmental education programs for K-12 education offered by the University. The State will generally need greater investment in Alaskan teachers to ensure less turnover and a greater focus on “home-grown” teachers across the state.
- The Governor should establish a teacher recognition award program for outstanding environmental science education that comes with resource incentives such as access to experts, technology, or field school programs for students.
- Finally, in terms of teacher resources, there needs to be a greater deployment of STEM-focused resources and investment in STEM programs.

5.3 Strengthen the University’s emphasis on research and education on science, climate change trends, impacts and opportunities, vulnerability, adaptation and mitigation, as well as related natural resource management and hazard forecast.

The University has a strong role to play in modeling the behavior it hopes to see established across the state, and it is encouraging to see already the credence it places on sustainability within on campuses. These efforts should be encouraged and reinforced by the State. To support the University’s overall sustainability goals, the State should prioritize and fund programs that support natural resource and environmental science, STEM, and climate science.

Action 5.3A: The State should communicate to the University of Alaska Board of Regents the importance of increasing educational attainment, STEM education and training opportunities, natural resource and environmental science resources, and Arctic and climate change awareness.

- The State should encourage and support interdisciplinary study of climate change through development of major and minors across departments. The University should take a leadership role in climate change research, education, and training and workforce development within Alaska. One of the ways the University can do this is to establish a general education requirement related to environmental science, climate change, and renewable energy.

- The State should support University efforts to offer a competitive grant program for faculty and students focused on research related to science; climate change causes, adaptation, and mitigation; and related natural resource management.
- The State should promote and support efforts to bridge science at the University with State and private practitioners, including encouraging State agencies to collaborate with the University programs.
- As part of this process and to increase public awareness, faculty should be encouraged to develop and deliver short courses for state and local policymakers on the following topics: climate change impacts, vulnerability and risk assessment, and transition strategies in energy and other economic sectors.
- The University can be encouraged to invest further in its natural resource and environmental science programs.
- The State should work with Alaska Pacific University and other tribal colleges to expand on their sustainability emphases.

5.4 Facilitate the development of energy, adaptation and mitigation training, and workforce development programs.

Public and private nonresidential facilities are often managed without a clear strategy, and maintenance is reactive instead of preventative. There are existing training programs for rural facility/energy managers that could be used to train a single “village energy manager.” There should be an effort to demonstrate to tribal/city administrators and community leaders the cost effectiveness of creating this paid position and providing training.

Training efforts must meet Alaskans where they are and be focused on real job opportunities. Many rural Alaskans cannot afford the time away from their jobs, families, and communities to travel for training. Local and regional training should be encouraged, including the use of apprenticeships and circuit riders. K-12 education, job training, and university programs should be networked to avoid duplicity and fill identified gaps. There should be greater use of distance learning and web-based training to enhance worker skills.

Many training centers are already established. However, it is often difficult for any one of the smaller centers to offer programs focused on renewables, efficiency, and/or alternative fuels because there are not enough trainers or students to support the programs.

Action 5.4A: Expand statewide efforts to train Alaskans, with specific attention to underserved areas, in residential and commercial energy audits, weatherization, and retrofit techniques.

- DOL&WD and DEED should continue to collaborate with stakeholders that are already a part of the Alaska Network of Energy Education and Employment to identify ways to leverage existing state programs and resources to increase energy literacy and focus on underserved areas of the state.
- The Denali Commission should reestablish its workforce development program and work with Alaska’s congressional delegation to secure necessary funding for training and capacity building, consistent with its role as federal lead for climate change coordination.
- AHFC and AEA should work with DOL&WD to develop a chapter on this topic in the Green Jobs Report and contribute to the State’s strategic plan.

Action 5.4B: Support existing and establish training centers across the state to train on various renewable energy technologies (solar, wind, hydro, biomass, geo-exchange, etc.), transportation efficiency, and alternative fuels.

- “Train the trainer” programs should be established to increase the number of instructors. K-12 STEM curricula should be emphasized and supported by DEED to increase the number of interested students. Importantly, program curricula should be designed with specific jobs in mind, like building energy management, or power plant operation. There should be greater use of distance learning and web-based training to enhance worker skills.
- The State should encourage greater collaboration, coordination, and knowledge sharing among the ten Alaskan Regional Training Centers (RTCs) spread throughout the state. RTCs should play a key role in identifying the most effective curricula and instructors within specific training sectors and cooperate in the outreach and delivery of these programs.
- The State should increase funding for the Alaska Vocational Technical Center (AVTEC). The institution is first among the RTCs and is widely acknowledged as an affordable, practical, and effective pathway for Alaskans seeking sustainable careers; AVTEC is one of the state’s real strengths and bright spots in training Alaskans and elevating energy literacy.
- DOL&WD’s Green Jobs Report should include a strategic plan that includes a stepwise approach to assessing current job needs and identifying clean energy jobs that do not yet exist, but will emerge as part of Alaska’s energy transition. As growth in the industry occurs, the State should be prepared to increase support of training and workforce development.

Action 5.4C: Continue to strengthen capacity around and expertise in effective and efficient microgrid development.

- An efficient microgrid starts with a holistic approach that includes efficient buildings and trained personnel. The State should support entities and partnerships that are already focused on increasing Alaska’s ability to export its expertise in microgrid development.
- Alaska’s disparate communities cover vast distances and continued efforts to deliver remote education and training position Alaska to be a world leader in terms of creating and delivering digital educational content. If STEM skills and general energy literacy are Alaskan’s response to climate change, then delivering these lessons over long distances in a compelling fashion (including the use of Augmented Reality and Virtual Reality) is a tremendous opportunity.
- The building trades and unions have expressed an interest in cross-training apprentice hires in clean energy and energy efficiency. For example, HVAC trainees are expected to be familiar with modern building monitoring technologies. An opportunity exists to encourage and expand this growing interest in transitioning traditional occupations to green or clean jobs.
- New clean energy technologies are being considered and experimented with by traditional Alaskan resource development industries (mining, oil, gas, and maritime). The University should aggressively seek out partnerships that capitalize on the wealth of experience and knowledge it possesses within the microgrid sector.

Action 5.4D: Develop workforce development programs for Alaskan workers displaced from fossil energy industries (and support industries) as a result of reduced local and global demand for Alaska's nonrenewable energy resources.

- Like the Pipeline Training Center in Fairbanks, the State should work to anticipate a potential workforce need as part of a clean energy transition. Alaska Technical Vocational Education Program funds should be allocated to training Alaskans transitioning from oil, gas, and coal industries.
- The focus of this workforce development should be on skills related to energy efficient building retrofits, renewable energy systems development, and additional diversified economic sectors. Some support industry contractors may be able to easily shift to support clean energy projects.



6 Investment

Develop and implement equitable funding mechanisms for the State's climate change strategy.

6.1 Increase the financing opportunities available for affordable and low-carbon renewable energy and energy efficiency activities.

In Alaska, energy efficiency grant programs administered by AHFC and AEA have consistently shown energy savings of 20% to 30% through economic efficiency improvements to both residential and nonresidential buildings. From 2008 to 2015, the Alaska State Legislature appropriated more than \$600 million to fund the State's low-income weatherization and home energy rebate programs. Those programs helped more than 50,000 Alaskan homes become more energy efficient, with an average energy savings of 33% per household. Today, AHFC estimates those improvements are saving the equivalent of 25 million gallons of heating oil every year.

Action 6.1A: Establish a Green Bank to develop long-term, state-led financing of renewable energy and energy efficiency.

- Programs to finance and support residential, commercial, and public building energy efficiency retrofits could all be developed under the auspices of a state green bank. Green banks are public finance authorities that use limited public dollars to leverage greater private investment in clean energy. Their goal is to accelerate clean energy market growth and make energy cheaper and cleaner for consumers—driving job creation and preserving taxpayer dollars. Green banks deploy public capital efficiently through financing to maximize private investment and lower the costs of clean energy to spark consumer demand. Rather than rely strictly on grants that cannot bring markets to scale, green banks use limited public funds to offer financing that attracts private investment. This way, each public dollar goes further and can be recycled. Green banks also facilitate market development by working with originators and lenders and offering the information consumers and businesses need to confidently purchase clean energy. By connecting capital supply and customer demand, green banks grow markets. Under a State green bank, individuals and business owners could borrow money for energy efficiency upgrades through loans that are specifically structured so that the monthly loan payment is less than the borrower is saving each month on their energy bills.

- In 2017, the Alaska State Legislature passed a bill that now authorizes municipalities across Alaska to set up Commercial Property Assessed Clean Energy (C-PACE) programs to finance energy improvements in commercial buildings. Under a C-PACE program, commercial building owners can borrow money from their local property tax authority and then pay the municipality back through a special tax assessment on the building. This type of financing tool attaches the debt to the property, not the borrower. It also typically gives the borrower more time to repay the loan than a commercial loan would, allowing the annual energy savings from the building improvements to immediately exceed the special tax assessment payments. AEA is working with C-PACE experts from around the nation and several interested Alaska municipalities to develop a C-PACE program that individual municipal assemblies can adopt. However, once the C-PACE programs are adopted by local tax assessment districts, those municipalities must still find dollars to loan to commercial building owners who wish to participate in the program. Rather than using their limited bonding authority, municipalities could borrow the dollars necessary for C-PACE programs from a state green bank and pay the bank back as tax assessment repayments from business owners are received.

Action 6.1B: Explore the state’s ability to access or leverage venture capital funds, reinsurance programs, and other innovative opportunities for funding.

- The Department of Revenue, AIDEA, and other financing arms of the State should consider ways to support the State’s climate change strategy, especially this Alaska Climate Change Action Plan. As part of this process, the Department of Commerce, Community, and Economic Development should produce a plan on agency ability to access or leverage venture capital, reinsurance funding, startup capital, or foreign direct investment. Many of the efforts to establish and accelerate a transition to a lower-carbon economy will be investable and global capital will be responsive to these goals.
- The State should consider establishing an Alaska-based venture capital fund focused on early-stage cleantech companies to encourage entrepreneurial companies in Alaska with ideas related to climate change solutions, mitigation, or adaptation. Such a fund could be capitalized with earnings from a carbon tax or through placement of a portion of permanent fund investments in Alaska-based venture capital funds with a focus on cleantech. This form of capital for high growth startups serves a different and complementary purpose to a green bank.

Action 6.1C: Apply funding from state-owned facility energy efficiency savings to clean energy investments.

- State departments should be given direction by the Governor’s Office or the Department of Administration to pursue energy efficiency measures.
- Each State department should report to the Alaska State Legislature how much they are saving due to energy efficiency improvements, including those funded by contracts with Energy Service Companies (ESCOs). The State could also form its own ESCO. The Legislature could then elect to appropriate a percentage of those savings to a state green bank. The green bank could then finance energy retrofits, as described above.

Action 6.1D: Commit and enhance long-term funding for research, renewable energy, and emerging energy technology development.

- The State should seek long-term funding for research into renewable energy and emerging energy technology development. Research priorities should be coordinated by the University, in collaboration with other partners. Emerging technology development should be coordinated through the existing Emerging Energy Technology Fund administered by AEA. Research and development should be aligned with other State energy efficiency and renewable energy goals.

- This is an area where the State should advocate for increased federal investments.

Action 6.1E: Implement renewable energy tax credits.

- Renewable energy tax credits are one option for the State to consider to promote renewable energy development. Because they are not carbon based, renewables would effectively be credited if a tax on carbon-based fuels existed. Most state renewable energy tax credits are production credits given to developers based on the number kilowatts generated—similar to the federal production tax credit for renewables that is being phased out. Since Alaska does have a corporate income tax, it would be possible for the State to implement, through State legislation, a state renewable energy production tax credit.
- The other common renewable energy tax credit is given to individuals to incentivize behavior like installing solar panels or purchasing EVs. If the State established a state income tax, State tax credits like these could also be established. The State could also dedicate a new sales tax revenue stream (from online purchases entering state) to carbon reduction initiatives.

6.2 Collaborate with federal partners and encourage increased federal funding for programs in support of climate change mitigation and adaptation.

6.3 Evaluate the development of a carbon fee and dividend program.

Carbon taxes are set by government, and disincentivize the use of carbon-based fuels by making them more expensive. For administrative purposes, if possible, most carbon taxes are levied “upstream” at the location where the carbon-based fuel is either taken out of the ground or brought into the jurisdiction. The entity being taxed then raises the price of the product and downstream consumers must pay more, use less, and/or switch to noncarbon alternatives. Since Alaska is a state where massive amounts of carbon-based fuel are taken out of the ground, a carbon tax would be levied on far more carbon-based fuel than Alaskans consume themselves. This is a potential advantage of a carbon tax that Alaska has over other states and nations.

Action 6.3A: Research and develop a plan for a state carbon fee, to include consideration of effective fee levels and ways that a dividend could be applied to consumer cost and renewable energy investments.

- Carbon taxes can be either revenue positive or revenue neutral. The State should consider the tradeoffs between the two, both in terms of providing dividends to compensate citizens for the increased price of carbon-based fuels and for use to capitalize something like the green bank.
- Dividends from the revenue obtained from the carbon fee should be calculated so households at or below the median income level receive, on average, an amount equal to or greater than the additional costs they are projected to face as a result of the carbon pricing. The State can use the receipt of a Permanent Fund dividend as a qualifier. A portion of the revenues should be directed to the State’s green bank, if established. The Legislature will have to determine an appropriate amount consistent with climate change strategy goals and affordability.
- A portion of the revenue should be used to help offset short-term impacts felt by those to whom the fee applies. A structure will need to be developed so impacts do not overly burden the company or disrupt economic development in the short term, even as this support should diminish as time passes.

- Adopting carbon pricing at the state level increases the economic risk for Alaska. These risks need to be understood better before proceeding. At the very least, costs at one level will be passed onto consumers and downstream businesses. A dividend approach helps to alleviate this, but other ways to approach it are to ensure the fee is not overly burdensome or high, and can scale up over time as technology and processes improves.
- To effectively implement a carbon fee and dividend, the State should conduct an analysis of carbon pricing mechanisms and ask for an update from the University of Alaska Institute for Social and Economic Research on their study of the carbon fee and dividend impact on rural Alaska.

Action 6.3B: Consider the costs and benefits of endorsing national fee and dividend legislation, including specific Alaska requirements.

- There are benefits to a national decision to implement a carbon fee and dividend, and although the state may act sooner than the nation in developing a carbon fee and dividend, the state should also consider advocating for national legislation. The benefits from this include a level playing field and streamlined expectations across the sector, reducing the overall risk of making any single state or individual industry less competitive.
- Taxes or fees intended to account for the high external costs of fossil fuel use can be applied at one or multiple levels within the economy. The rate applied can reflect the amount of carbon contained in a particular fuel and can be assessed at the point of production or at a point further down the supply chain depending on objectives. Pricing of the carbon content of fossil fuels at a national level will have different effects through the economy than pricing at a local or state level. Pricing through national legislation has high potential for leveraging carbon accounting at a global level by including provisions for border adjustments.
- As carbon fee and dividend programs are considered at the national level, Alaska should advocate for state-responsive priorities and needs, so that Alaska communities and businesses see impacts commensurate with their circumstance as low overall emitters with high energy costs. Additionally, if the State has approved its own carbon fee and dividend program, then implementation at the federal level will have to accommodate the state's system and not duplicate processes or increase the overall societal burden.

6.4 Explore and encourage opportunities to generate revenue from carbon sequestration.

Action 6.4A: Encourage opportunities for carbon sequestration through the use of Alaska natural resources, lands, and maritime environment.

- Natural climate solutions—protecting, restoring, and sustainably managing forests, farms and wetlands—enhance the ability to store carbon. A recent study led by Nature Conservancy scientists shows that natural climate solutions can cost-effectively deliver 37% of the greenhouse gas emissions reductions needed by 2030 to limit global warming to less than 2°C; this is 30% more than previously estimated.
- Natural climate solutions are available now and can be scaled up to transform key sectors of the global economy, such as forestry and agriculture. In fact, it will not be feasible to limit global warming to 2°C without changing how we conserve and use land. In addition, natural climate solutions provide a host of additional benefits. For example, restoring watershed forests can reduce flood risk and improve water quality and security. Agricultural practices such as cover crops, reduced tillage, and diverse crop rotations can improve soil health, boost production, and reduce water use. The State should investigate the opportunity to sequester carbon on public lands and water.

List of Acronyms

AKAES	Alaska Affordable Energy Strategy	EV	Electric vehicle
ACCIMP	Alaska Climate Change Impact Mitigation Program	EERS	Energy Efficiency Resource Standard
AHFC	Alaska Housing Finance Corporation	ESCO	Energy Service Companies
AIDEA	Alaska Industrial Development and Export Authority	EOR	enhanced oil recovery
AOGCC	Alaska Oil and Gas Conservation Commission	EIS	Environmental Impact Statements
AVTEC	Alaska Vocational Technical Center	FEMA	Federal Emergency Management Agency
BFU	Bulk Fuel Upgrade	HIA	Health Impact Assessment
CAIWG	Climate Adaptation Interagency Working Group	HVAC	heating, ventilation, and air conditioning
CALT	Climate Action Leadership Team	IAWG	Immediate Action Working Group
CCS	carbon capture and storage	LNG	liquefied natural gas
C-PACE	Commercial Property Assessed Clean Energy	OSV	Office of the State Veterinarian
DCCED	Department of Commerce, Community, and Economic Development	RTC	Regional Training Center
DEED	Department of Education and Early Development	RPS	renewable portfolio standard
DEC	Department of Environmental Conservation	RFP	Requests for Proposal
DHSS	Department of Health and Social Services	Risk MAP	Risk Mapping, Assessment and Planning Program
DOL&WD	Department of Labor and Workforce Development	RPSU	Rural Power System Upgrade
DNR	Department of Natural Resources	STEM	science, technology, engineering, and math
DCRA	Division of Community and Regional Affairs	ULS	Ultra-low sulfur
DHS&EM	Division of Homeland Security and Emergency Management		





climatechange.gov.alaska.gov

