

ANCHORAGE, AK

CLIMATE ACTION PLAN



Neighbors,

Anchorage, Alaska is the gateway to America's Arctic. Our diverse and dynamic city of 300,000 people sits on the homelands of the Dena'ina Athabascans. As Alaskans, change is our steady state – between seasons, the amount of daylight, past and future. Now, accelerated changes have affected our natural environment. The world around us is dramatically transforming -- everything from temperature and humidity levels to animal migration patterns and the length of fire seasons. Together, we can make the adjustments and adaptations required to live proactively in a changed and changing climate.

This Climate Action Plan builds on our traditions as a welcoming and resilient city. The plan places equity and inclusion at the heart of our social, environmental, and economic policies and practices. It affords us the opportunity to ensure that our people, our neighborhoods, and our businesses have the capacity to thrive as we respond to a changing climate and economy. It highlights deeply-rooted Alaskan traditions of innovation and collaboration.

Please join us as we work together to confront the challenge of climate change and take steps to reduce energy use, improve public health, promote energy independence, strengthen our economy and build a more livable and resilient community. As we show others that there is an Anchorage Way, our city can be a model and inspiration for good stewardship, good jobs, and stronger, healthier communities.

Sincerely,



Mayor Ethan Berkowitz

The Municipality of Anchorage acknowledges that our city sits on the traditional homelands of the Dena'ina Athabaskan peoples. The Municipality recognizes the governmental status of the Native Village of Eklutna and is committed to working with the Native Village of Eklutna as a government partner. The Municipality also acknowledges the vital role that the Eklutna Corporation has as the largest landowner in the Municipality. This Climate Action Plan is built on the recognition that Indigenous values and knowledge are foundational to our efforts to build community resilience.

2050 Vision for Anchorage

In 2050, Anchorage is a resilient, inclusive community whose residents are prepared for the impacts of a changing climate. Our residents are actively engaged in creating and implementing equitable and responsive climate actions, policies, and plans. Winter cities around the world look to Anchorage as a leader in stewardship and energy innovation in the face of climate change. Anchorage is self-sufficient and the heart of our state's globally competitive economy.

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The Anchorage Climate Action Plan is the result of a huge community effort. Many thanks to the Anchorage community and volunteers for their time and thoughtful contributions to the development of the plan.

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Anchorage Climate Action Plan at a Glance

To draft the Climate Action Plan, Municipal staff worked with a Steering Committee, an Advisory Committee, and nearly 100 technical advisors, including university faculty, staff and students, agency representatives, scientists, and community members. These groups helped identify the near-term actions most likely to result in the long-term changes necessary to achieve these ambitious climate action goals, while also advancing other community goals related to economic development, equity, resilience, and public health. Hundreds of Anchorage residents participated in community events and provided important ideas and feedback throughout the development of the plan.

In addition to the objectives and actions laid out in each of the sectors, the Climate Action Plan also has two overarching actions:

1. Complete a greenhouse gas inventory and update annually to assess progress towards climate goals.
2. Develop a framework for selecting, monitoring, and regularly disseminating indicators that track 1) environmental changes associated with climate change, 2) impacts of climate change and relevant socio-demographic and geographic information, and 3) adaptation measures and their effectiveness in Anchorage.

How is the Anchorage Climate Action Plan organized?

Highlights from each of the seven sectors are listed below with page numbers to direct you to the full chapter. In each sector chapter, you'll find a 2050 vision, objectives for 2030, and the action steps to achieve these objectives.

Buildings and Energy

- Expand local renewable energy generation and use
- Reduce energy use in existing and new buildings
- Use existing and innovative financing mechanisms and incentives to encourage renewable energy and energy efficiency
- Integrate long-term clean energy solutions into regional energy policy and planning

Read more on pages 32-38

Land Use and Transportation

- Improve transit options and non-motorized accessibility to major centers
- Encourage land use planning that reduces distance people have to travel by car and increases community resilience
- Transition to vehicles that are highly efficient and run on low-carbon and renewable energy fuels

Read more on pages 39-45

Consumption and Solid Waste

- Divert and reduce waste, extending the life of the landfill
- Capture more wasted energy in collected refuse
- Further educate and engage residents and businesses about waste reduction and diversion
- Create waste reduction targets across both Municipal operations and the Anchorage community
- Optimize refuse collection and disposal systems

Read more on pages 46-51

Health and Emergency Preparedness

- Develop strategies to enhance the health and safety of all Anchorage residents
- Collaborate and engage diverse groups of people across Anchorage in health and safety planning
- Build household, neighborhood, and community resilience and self-sufficiency for emergency situations
- Support creative and collaborative research to understand how climate change is impacting the health and safety of Anchorage residents

Read more on pages 52-60

Food Systems

- Expand opportunities and markets for Alaska Grown products
- Ensure that all Anchorage residents can access healthy, local foods
- Create opportunities for residents and businesses to reduce food waste

Read more on pages 61-66

Urban Forest and Watersheds

- Support wildfire mitigation and improve forest management to prepare for increased risk of wildfire
- Improve storm water management to mitigate flooding and promote better water quality
- Increase capacity to respond to invasive species outbreaks
- Monitor Eklutna watershed to ensure a resilient drinking water supply

Read more on pages 67-73

Outreach and Education

- Use effective and inclusive outreach methods to ensure that all Anchorage residents benefit throughout the implementation of the Climate Action Plan
- Motivate Anchorage residents, schools, businesses, community councils, and agencies to reduce their carbon footprint

Read more on pages 74-78

Introduction

Climate change is simultaneously one of the greatest threats and greatest opportunities facing Anchorage.

Nestled between Cook Inlet and the Chugach Mountains, Anchorage is the gateway to Alaska and the Arctic. Anchorage residents live here to have ski trails out their backdoor and the mountains minutes away. We enjoy hiking trails and bike paths winding through the city's parks and neighborhoods. Wildlife encounters with bears and moose are part of everyday life, and the 0.5 million acre Chugach State Park bordering the city serves as an endless wilderness opportunity for residents. These natural areas also support plant and animal populations that are important subsistence resources for residents; many Anchorage residents plan their summer and fall schedules around salmon runs, berry and mushroom seasons, and large mammal migrations.

Almost half of Alaska's population lives in Anchorage, and the municipality serves as the commercial hub of the state. Much of the economic activity and supply chain infrastructure that serves Western, Interior, and Northern Alaska is based in Anchorage. Transportation and shipping disruptions in Anchorage ripple throughout the state.

Alaska's climate is changing, and doing so more rapidly than in many parts of the world. Much of the research and documentation on climate change in Alaska has focused on issues faced by communities in the Western, Interior, and Northern parts of the state, such as thawing permafrost and receding sea ice. Although the ecological changes occurring in Anchorage are different from the rest of the state, many of the concerns -- such as threats to infrastructure, changes to important subsistence fish and wildlife habitat, and impacts on human health -- are similar.

The huge cost of maintaining and repairing damaged infrastructure in a warming climate is a concern statewide, with an anticipated annual cost of \$142 to \$181 million and \$4.2 to \$5.5 billion cumulatively by the end of the century.¹ This burden will be heavily shouldered by the Anchorage Municipality as over 27% of Alaska's paved roadways are maintained by the Municipality.² Similarly, the Port of Alaska receives over 85% of Alaska's commercial goods, and the aging infrastructure is susceptible to extreme storms and weather.³

These changes can be daunting; however, if we plan effectively, climate change also presents huge opportunities. Many of the actions outlined in this document have effects far beyond reducing greenhouse gas emissions. The transition to a low-carbon economy can create jobs, decrease operating costs of businesses and public utilities, and save residents money. The advanced clean energy sector is taking off worldwide -- an important role of the Municipality is to make Anchorage a favorable place for clean energy business investment. Preparing our community for potential climate-related natural disasters and developing strategies to make Anchorage more resilient can prevent costly emergency responses (See Box 1). Additionally, many local strategies to combat climate change can make Anchorage a better place to live, potentially attracting new businesses as well as new families. A more climate-resilient Anchorage means more public transportation options, access to healthier, Alaskan-grown food, improved air quality, and less congestion on roadways.

¹ <http://www.pnas.org/content/114/2/E122>

² <https://www.muni.org/Departments/operations/streets/Pages/default.aspx> and <http://dot.alaska.gov/FAQ.shtml>

³ <https://www.infrastructurereportcard.org/state-item/alaska/>

Box 1. Cost of Wildfire Response

Insect infestations, earlier snowmelt, and dry vegetation, which are all expected locally in the future, will make Anchorage's forests more susceptible to wildfires. Adapting our forest management strategies to account for these changes will help prevent catastrophic wildfires that would threaten our homes and natural areas. Increased fire management options will have economic implications. Estimated costs due to increased wildfires across Alaska are \$1.1 to \$2.1 billion from 2006 through the end of the century (<https://link.springer.com/article/10.1007/s10584-017-1923-2>).

Why Create a Climate Action Plan?

Over the last 50 years, Alaska has warmed twice as fast as the global average.⁴ The scientific community has asserted that the world is warming due to the human emissions of greenhouse gases.⁵ Almost all human activities in our modern lives contribute to the release of greenhouse gases in some way. This can occur directly through the fuel we put in our cars or use to heat our homes, or indirectly, through the production and transportation of food and goods we use every day.⁶ The two main greenhouse gases addressed in this plan are carbon dioxide (CO₂) and methane (CH₄), with the majority of actions in this plan addressing CO₂ emissions.

Alaska has the opportunity to be a world leader in reducing emissions. Although every region matters, Alaska's high per capita emissions give us more opportunity - and more responsibility - to affect change. Anchorage is joining a community of cities, states and organizations around the world in an effort to lower its contributions to climate change and build local capacity to combat the unavoidable environmental changes the world faces.

Local action to combat climate change

Local communities are leading the charge against climate change and Anchorage is no exception. Mayor Ethan Berkowitz has joined the Global Covenant of Mayors for Climate and Energy, an international coalition to combat climate change and progress towards a low-emission future. The Municipality has also signed a circumpolar declaration to serve the needs of all Arctic communities with other leaders from Alaska, Canada, Finland, Iceland, and Norway.

The Anchorage Climate Action Plan is a guiding document that provides a framework for policies that reduce emissions and a pathway to achieve long-term outcomes that reflect the values of Anchorage as an equitable and resilient community. This plan also creates a platform for cooperation among residents, the business community, universities and schools, and other community based organizations to engage in important conversations around sustainability and growth. The plan integrates subject matter expertise, data on projected climate changes and potential impacts, and community voices to create a straightforward roadmap to guide policymakers in Anchorage.

⁴ <https://nca2018.globalchange.gov/chapter/26/>

⁵ Huber and Knutti 2012, Anthropogenic and natural warming inferred from changes in Earth's energy balance, Nature, <https://www.nature.com/articles/ngeo1327>

⁶ https://www.epa.gov/sites/production/files/2016-05/global_emissions_sector_2015.png

Building on a Foundation - What is already happening in Anchorage?

Buildings and Energy

- The Energy Smart Lighting initiative began retrofitting 16,000 of Anchorage's street lights with more efficient LED light bulbs. This switch is also taking place in fire stations, the Dena'ina Center, and the Anchorage Golf Course. This initiative alone saves the Municipality \$780,000 annually in energy costs.⁷

Land Use and Transportation

- Anchorage's transportation authority, Anchorage Metropolitan Area Transportation Solutions (AMATS), has adopted a "Complete Streets" policy to govern project planning and engineering standards. This plan expands the focus of streets from cars alone to all types of users. By taking into consideration the needs of pedestrians, bicyclists, motorists, and transit riders, the new program will increase safety, decrease congestion, and expand transportation options. Anchorage's first Complete Streets project was on Spenard Road. The project featured colored bike lanes, wider sidewalks, and pedestrian crossings.⁸

Consumption and Solid Waste

- The Municipality of Anchorage Solid Waste Services (SWS) piloted a community compost program in 2017 that allowed customers to drop off organic waste at both landfills. In exchange, customers could pick up finished compost. SWS grew the program in 2018 by allowing customers to sign up for the curbside organics pilot program. In 2018, 105 tons of organic waste were kept out of the landfill, more than double what was collected in 2017.
- Solid Waste Services collects methane, a natural byproduct of organic material, at the Anchorage Regional Landfill. This powerful greenhouse gas is used to create electricity for Joint Base Elmendorf Richardson, generating enough energy per year to power the equivalent of 6,400 homes.

Health and Emergency Preparedness

- The Office of Emergency Management translates key emergency preparedness documents into languages for non-English reading residents. These include family emergency plans and emergency supplies documents. Outreach materials available in seventeen different languages (including Spanish, Tagalog, Hmong, Samoan, Korean, and Alaska Native languages) include: *Earthquakes*, *Emergency Supplies*, *Water in an Emergency*, *Emergency Go Bag*, and *Drop! Cover! Hold on!* (short film).⁹

Food Systems

- Anchorage Parks and Recreation currently operates four community gardens. The Master Plan for Chanshtnu Muldoon Park includes space for 54 new garden plots, funded through an Anchorage Park Foundation Challenge Grant. An additional 12 new 10' x 20' garden plots were added at the Fairview Lions Park community garden in 2018.
- Edible planting projects are taking place throughout the Municipality. The new Fairview Park Master Plan responded to neighbors' wishes to see edible landscaping in the park, and volunteers planted apple trees, berry bushes, and other edibles in the park in May 2017. Food forest and orchard projects are also underway at Chanshtnu Muldoon Park and Government Hill Commons, including apple, cherry, and pear trees and raised beds of blueberries, raspberries, and other fruits.

⁷ <https://lighting.cree.com/applications/case-studies/city-of-anchorage>

⁸ http://www.muni.org/Departments/OCPCD/Planning/AMATS/Policy_Committee/2018/072618/5B_Attachment%20A_Draft%20Complete%20Streets%20Policy.pdf

⁹ <https://www.muni.org/Departments/OEM/Prepared/Pages/EmergencyPreparednessInformationinManyLanguages.aspx>

Urban Forest and Watersheds

- The Municipality Firewise Home Assessment Program provides home visits to offer specific recommendations for vegetation management, home maintenance, and fire prevention through federal funding assistance.¹⁰

Outreach and Education

- Anchorage Bike to Work Day is a local celebration of the national event initiated in 1965 by the League of American Bicyclists. Each May, Bike to Work Day is a celebration of community and health, as residents pedal their way to their sites of employment. Rider participation has increased 260% since 2007; in 2017, over 4,000 people participated in the local event.¹¹

University collaboration

The Anchorage Climate Action Plan was developed through a collaboration with the University of Alaska (UA). University faculty led the working groups and provided technical expertise for each of the sectors represented in this plan. The actions in this plan were developed through collaborative discussions between UA faculty, staff, and students and Municipal employees, as well as many other community partners and Anchorage residents. The university partnership provided critical capacity and input. Continued collaboration will allow the Municipality to leverage the resources and research experience at the University, resulting in data-driven management decisions with local expertise rather than hiring outside consultants.

The collaborative development of the Climate Action Plan also created the opportunity for students to participate in the Municipal planning process. Several students were also part of the working groups and sat at the table with faculty, Municipal staff, and community partners, participating in discussions about the most effective mechanisms for climate mitigation and adaptation in Anchorage.

Success requires action at all levels

Moving the needle on global greenhouse gas emissions and protecting our communities from climate impacts requires action at the individual, household, neighborhood, and community levels, in addition to coordination across local, state, and federal governments. Many communities and Alaska Native tribes throughout Alaska are conducting adaptation planning or creating climate action plans.¹² Homer, Alaska developed its first climate action plan in 2008 focused on mitigation.¹³ The town is currently updating its plan through a series of workshops to incorporate adaptation needs.¹⁴ The Municipality of Anchorage is proud to be a leader in developing a comprehensive Climate Action Plan that can serve as a model for other Alaskan communities.

In addition, many of the actions in the Climate Action Plan cross boundaries between traditional Municipal departments or require collaboration between university partners, local non-profits, and Anchorage residents. Implementation of the actions in this plan requires effective communication and creativity to develop strategies that help meet Anchorage's mitigation and adaptation goals while also meeting the needs and goals of all partners.

¹⁰ <https://www.muni.org/Departments/Fire/Wildfire/Pages/MyFirewiseHome.aspx>

¹¹ <https://www.muni.org/Departments/health/Admin/environment/AirQ/Pages/biketoworkday.aspx>

¹² <https://accap.uaf.edu/sites/default/files/resources/Meeker%20and%20Kettle%202017%20Synthesis%20CAP%20Alaska%20Native%20Communities.pdf>

¹³ https://www.cityofhomer-ak.gov/sites/default/files/fileattachments/city_council/page/6722/climate_action_plan.pdf

¹⁴ <https://toolkit.climate.gov/case-studies/town-plan-community-climate-and-conversations>

Guiding principles for the Anchorage Climate Action Plan

The Anchorage Climate Action Plan addresses both *mitigation* and *adaptation*. Many of the actions in this plan are focused on addressing the primary cause of climate change by reducing greenhouse gas emissions. However, Anchorage residents are already experiencing many initial impacts of climate change, including warmer winters, icier roads, and more winter rain. The Climate Action Plan includes actions that will help Anchorage prepare for these and future impacts.

Anchorage is home to many different racial and ethnic groups, and ranks within the top 30 U.S. cities in terms of the percentages of Alaska Native, Filipino, Korean, Hmong, Laotian, Thai, and Pacific Islander residents.¹⁵ Disparities in income and health persist in Anchorage, and climate change has the potential to exacerbate these inequalities. The Climate Action Plan was developed with *climate equity* at its core (see page 27). Through inclusive dialogue and action, work on climate mitigation and adaptation can improve quality of life for all Anchorage residents.

Many strategies to decrease greenhouse gas emissions have positive benefits for the local economy, environment, and public health in addition to the potential to increase equity across Anchorage. Each of the actions in the plan have these *co-benefits* noted in the action tables. Co-benefits are key opportunities to leverage the impact of the recommendations in the plan to create jobs, improve public health, advance equity, and strengthen our local ecosystems.

Mitigation actions work to slow the effects of climate change by reducing greenhouse gas emissions produced in Anchorage. These strategies target key sources of emissions such as energy consumption in buildings, vehicle emissions, food transportation, and solid waste management.

Adaptation refers to the activities and strategies that the Municipality and its partners can implement in order to prepare for the impacts of climate change. Anticipating these changes such as warmer winters and increased wildfire risk can guide policies to prevent or minimize impacts on Anchorage's infrastructure, ecosystems, and residents.

Climate equity ensures that the effects of climate change are addressed through policies and projects that directly address inequality and equally disperse the benefits to all communities.

Co-benefits refers to the positive benefits for the economy, public health, equity, and the local environment as a result of mitigation and adaptation actions that are directed at reducing greenhouse gas emissions and preparing for climate impacts.

¹⁵https://www.researchgate.net/profile/Chad_Farrell/publication/295254164_The_Anchorage_Mosaic_Racial_and_Ethnic_Diversity_in_the_Urban_North/links/58d544a292851c44d44cdae6/The-Anchorage-Mosaic-Racial-and-Ethnic-Diversity-in-the-Urban-North.pdf

Climate change in Anchorage

What changes have already been observed?

Temperatures have been increasing in Anchorage. In addition to normal year-to-year variability, scientists have observed a trend of increasing average seasonal and annual temperatures since 1949, when reliable meteorological data first became available (Figure 1). Looking more closely at seasonal trends, scientists have observed increases in temperatures across all seasons, but winter changes are most extreme. The average winter temperature has increased 6.7 °F over this time period.¹⁶ There has also been notable warming in the spring, but warming has been more moderate in summer and fall. Although there is variation from year to year, the average annual temperature in Anchorage has been warmer than the long-term average (1954-2018) all but three years since 2000.¹⁷

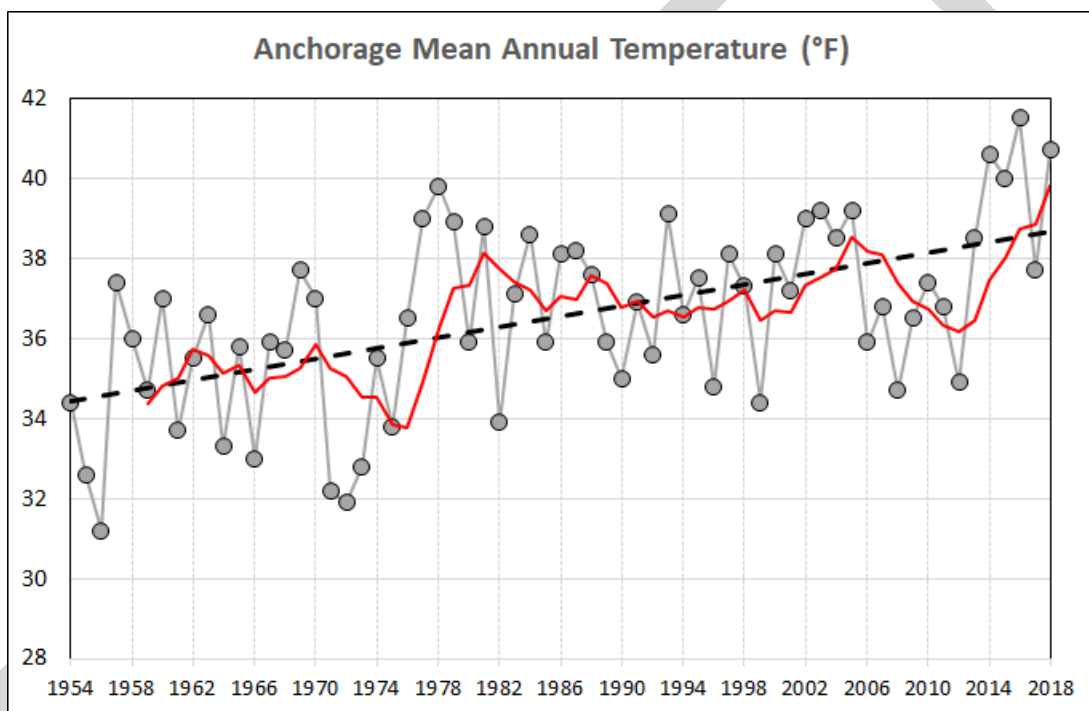


Figure 1. Average annual temperature in Anchorage from 1954-2018. The black line show the trend in increasing temperature. The red line shows the 5-year average. (Source: NOAA Regional Climate Center, <http://xmacis.rcc-acis.org/>)

¹⁶ <https://www.ncdc.noaa.gov/data-access/land-based-station-data/land-based-datasets/climate-normals/1981-2010-normals-data>

¹⁷ Alaska Climate Research Center, <http://akclimate.org>

What do you think Anchorage’s “climate normal” is? Climate scientists use the concept of *Climate Normals* as a way to describe the typical, expected climate pattern in a given area. Looking at these average values can provide context for understanding what it means when scientists say that our annual average temperature will be 4 to 5°F warmer by 2040 (compared to historical baselines).

Many of us also have a concept of the type of climate pattern we expect to experience in the place we live. The chart below shows the normal monthly values for Anchorage for daily highs, lows, mean temperatures, rain, snow, and snowpack. These “normal” values are calculated using data from 1981 to 2010.

Before looking through the numbers in the chart, think about the type of climate you expect in Anchorage. What do you think the average temperature is in January? What months do we typically get snow? How long does that snow stay around? How hot does it get in the summer? Do these data support your perceptions about a “normal” Anchorage climate, or are there any surprises?

| Normals (1981-2010) | | | | | | | | | | | | | |
|-------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|---------------|
| Element | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL |
| Mean Temperature (°F) | 17.1 | 20.2 | 26.5 | 36.8 | 47.8 | 55.2 | 58.8 | 56.7 | 48.5 | 34.8 | 22.2 | 19.0 | 37.1 |
| Mean Maximum Temperature (°F) | 23.1 | 26.6 | 33.9 | 44.5 | 56.0 | 62.8 | 65.4 | 63.5 | 55.1 | 40.5 | 27.8 | 24.8 | 43.8 |
| Mean Minimum Temperature (°F) | 11.1 | 13.8 | 19.2 | 29.1 | 39.6 | 47.7 | 52.2 | 50.0 | 42.0 | 29.1 | 16.6 | 13.2 | 30.4 |
| Precipitation (in.) | 0.7 | 0.7 | 0.6 | 0.5 | 0.7 | 1.0 | 1.8 | 3.3 | 3.0 | 2.0 | 1.2 | 1.1 | 16.6 |
| Snowfall (in.) | 11.3 | 10.9 | 9.9 | 4.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.4 | 7.9 | 13.1 | 16.7 | 74.5 |
| Snow Depth (in) | 10.9 | 12.4 | 11.9 | 3.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 4.3 | 9.1 | 4.5 |

Figure 2. "Climate normals" based on records from 1981-2010. (Source: NOAA National Centers for Environmental Information, <https://www.ncdc.noaa.gov/data-access/land-based-station-data/land-based-datasets/climate-normals/1981-2010-normals-data>).

The observed trend in precipitation is harder to discern than the change in temperature, due in part to the extreme variability of precipitation over space and time. Moreover, tracking changes in precipitation is complicated by the fact that temperature plays a role. If more precipitation arrives as rain rather than snow, or if snow is warmer, denser, and more prone to compaction, the impacts of precipitation will be different, even if the totals are the same.

The amount of snow on the ground is one of the most difficult daily weather variables to collect, and the location and method of measuring snow can substantially impact our historical weather records. One thing that is clear from historical snow monitoring in Anchorage is that the date of the first

snowfall of the year is getting later, and the date of the last snowfall is getting earlier. Compared to 1958-1987, the average date of first snowfall in Anchorage is a week later than it used to be.¹⁸

Measuring Snow in Anchorage. Anchorage is a snowy city. Some years more snow falls than others. The long-term average is 70" to 75" per winter. As little as 30" and as much as 135" have fallen in extreme years. Since 1998, the official snow measurement location is the National Weather Service Office at the corner of Raspberry and Sand Lake roads in west Anchorage. A trained observer measures any new snow that accumulates on a whiteboard four times a day, notes the total, and sweeps all snow off the board. Once per morning, the total snow on the ground (snow depth) is measured.

The amount of snow on the ground at the official site is often more than is observed in other parts of town. The site is very sheltered from wind and sun, and is far from the Chugach Mountains – therefore experiencing less intense Chinook warming events. As the climate has warmed, the snow total has not changed significantly since the vast majority of winter days are still below freezing; however, as winter temperatures continue to warm and more days exceed the freezing mark, the snow totals are expected to drop dramatically.¹⁹

Anchorage’s future climate

We can get a glimpse of the future climate in Anchorage using models that take into account important global drivers of climate, including the atmosphere, oceans, and land and ice cover. By the 2040’s, the average annual temperature in Anchorage is expected to increase by 4 to 5°F, as compared to the historical baseline (1981-2010).

The average monthly temperature is also expected to increase in all months, compared to a 1981-2010 baseline (Figure 3). Increases are expected to be greatest in the winter, but are predicted across all seasons. Changes in shoulder seasons may have large impacts on residents. For example, the average March temperature in Anchorage is below freezing. By 2040, the average temperature in March is expected to hover around the freezing point, but by 2060, freezing temperatures in March may become rare.

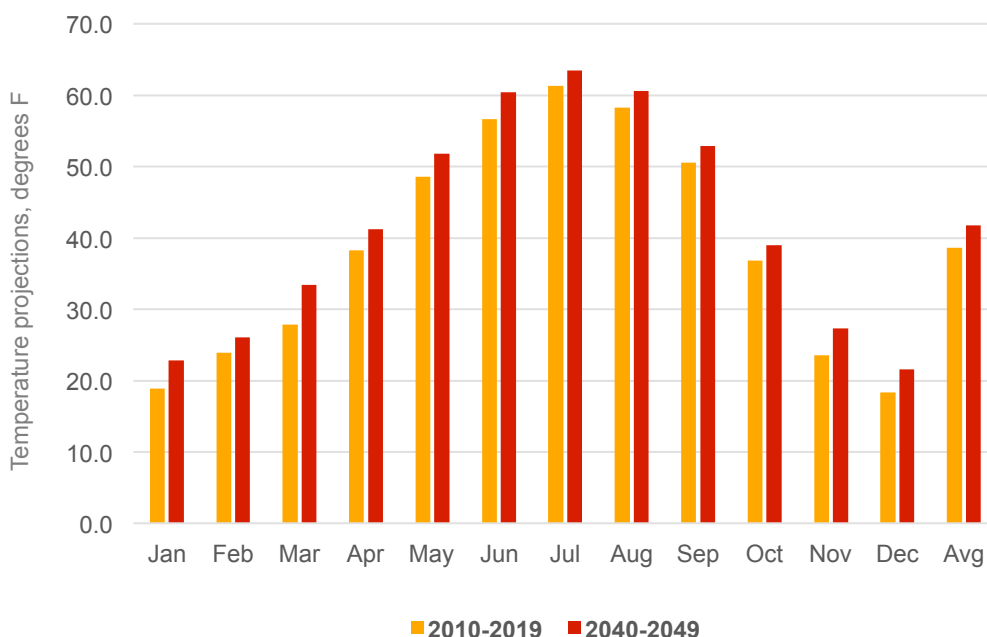


Figure 3. Modeled data for current and future temperatures in Anchorage. Graph shows mean monthly and mean annual projections. (Source: Scenarios Network for Alaska and Arctic Planning, www.snap.uaf.edu).

Climate extremes in Anchorage, especially the highest daily maximum temperature, are expected to increase in a changing climate. Anchorage is known for mild summer temperatures. Historically, temperatures over 80 °F have been almost unheard of, standing as all-time records. But in the last several years, the number of warm summer days has been increasing. Daily summer highs tend to be about 7 °F hotter than daily averages, with typical daily highs in July at 65 or 66 degrees.²⁰ Average daily highs will likely reach 70 degrees. Additionally, highs over 80 degrees and even as high as 85 degrees will become much more common.

In the same time period, winters are expected to become more mild. The lowest daily minimum temperatures during the coldest months are expected to increase by about 7 degrees, and the typical number of days in January with a mean temperature below freezing is expected to decrease from about 20 days to only about 10 days by 2040.²¹

The projected trend in precipitation in Anchorage in the coming decades is considerably more complex than temperature. On average, the amount of precipitation Anchorage receives each month is expected to increase by the end of the century (Figure 5). But this is only part of the story. In order to understand changing precipitation patterns in Anchorage, changing temperature patterns also need to be considered. Anchorage is expected to experience more “rain on snow events” as the number of winter days below freezing decreases. Although snowfall is difficult to predict because it depends on so many factors, as we have seen in Southeast Alaska, warming winter temperatures dramatically decrease winter snowfall totals. As the average winter temperature in Anchorage continues to increase, we expect to receive more winter precipitation in the form of rain, instead of snow.²²

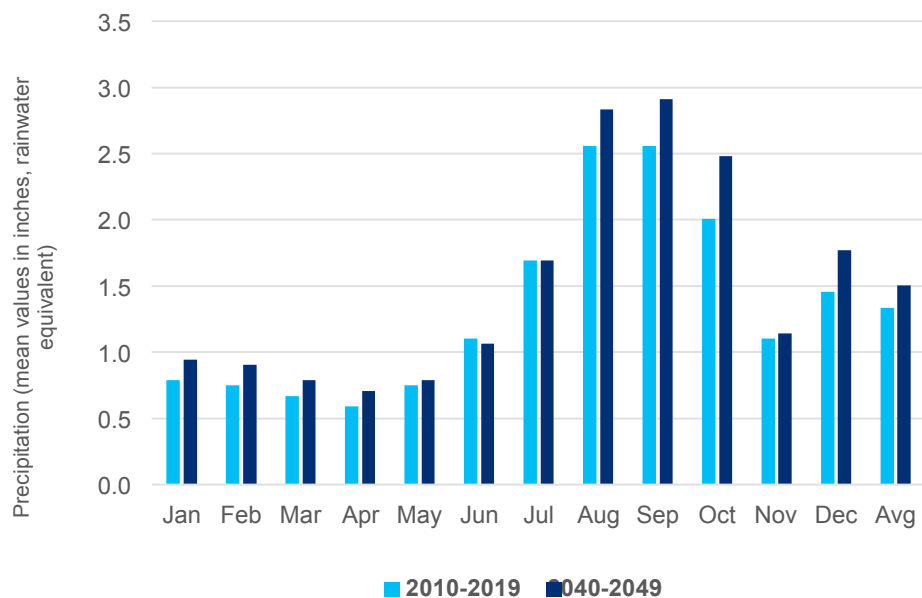


Figure 4. Modeled data for current and future precipitation in Anchorage. Graph shows mean monthly projections and annual projections. Note that more precipitation is likely to arrive as rain than in the past, and warmer temperatures tend to have a drying effect, so overall projections for seasonable water availability are difficult to derive. (Source: Scenarios Network for Alaska and Arctic Planning, www.snap.uaf.edu).

²⁰ Alaska Climate Research Center, <http://akclimate.org>

²¹ Scenarios Network for Alaska and Arctic Planning, www.snap.uaf.edu

²² https://accap.uaf.edu/sites/default/files/climate_dispatch_May_2018_FINAL.pdf

Climate change impacts in Anchorage

Many of these changes are already occurring in Anchorage, and we have experienced how changes to winter weather can dramatically alter our day to day transportation options and safety. As these changes to the climate progress, they will result in multiple significant impacts.

Increased frequency of freeze-thaw cycles in the winter will increase wear on pavement and building infrastructure and will require more frequent maintenance. Icy roads impact public safety when driving, biking, or walking down the street. Extreme precipitation events or sudden melting of ice and snow due to a warm event in the winter will increase the risk of erosion and flooding of Anchorage roads, sidewalks, bike paths, and trails. More winter precipitation in the form of rain also severely limits winter recreation opportunities for Anchorage residents. There will be fewer days each year when our winter trail system in the city can support cross country skiing, a favorite way for many Anchorage residents to get outdoors during the dark winter months.

There are also many potential climate impacts that are more difficult to predict. Runoff from Eklutna Glacier provides 86% of Anchorage’s drinking water and is used to create hydroelectric power for the Municipality. The glacier is disappearing as a result of climate change.²³ At the current rate of warming, scientists expect Eklutna Glacier to disappear in about 100 years, but if the climate warms at a faster rate, this timeline could be cut in half. Between 2010 and 2015, 7-13% of the water volume in Eklutna Reservoir was due to annual net loss of the glacier.²⁴ As the glacier disappears, this additional contribution to the reservoir each year will eventually stop, resulting in lower water supplies for Anchorage.

| Potential impacts of climate change in Anchorage | |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Human health | <ul style="list-style-type: none"> ● Heat-related illness ● Increased respiratory illness due to an increase in allergens, mold spores, dust events, or wildfire smoke ● Increased exposure to vector-borne diseases ● Changes to reliability and availability of subsistence food sources ● Increases in shellfish toxins ● Mental health impacts ● Decreased to winter recreational opportunities |
| Natural systems | <ul style="list-style-type: none"> ● Increased risk of wildfires ● Changes in location and quality of available habitat for important animal species ● Unpredictable salmon returns ● Changes to water availability |
| Infrastructure and the built environment | <ul style="list-style-type: none"> ● Increased wear on pavement due to increased frequency of freeze/thaw cycles ● Increased erosion and the potential for turbidity in water supply ● Increased risk of flooding of roads, sidewalks, bike paths, and trails |

²³ 2017 Anchorage Drinking Water Quality Report
<https://www.awwu.biz/home/showdocument?id=420>

²⁴ https://www.cambridge.org/core/services/aop-cambridge-core/content/view/A848874CAB3F39E0CF3FEF29289B8FD4/S0022143016001465a.pdf/geometry_mass_balance_and_thinning_at_eklutna_glacier_alaska_an_altitudemassbalance_feedback_with_implications_for_water_resources.pdf

Warmer temperatures throughout the year will have a range of impacts in Anchorage. As the number of days below freezing decreases, the length of the growing season will begin to expand. By 2040, the number of days per year that have mean temperatures above freezing is expected to increase by anywhere from 5-15 days (Figure 6). This change may be an opportunity to explore growing new fruit and vegetable varieties that require more time in the ground to develop.

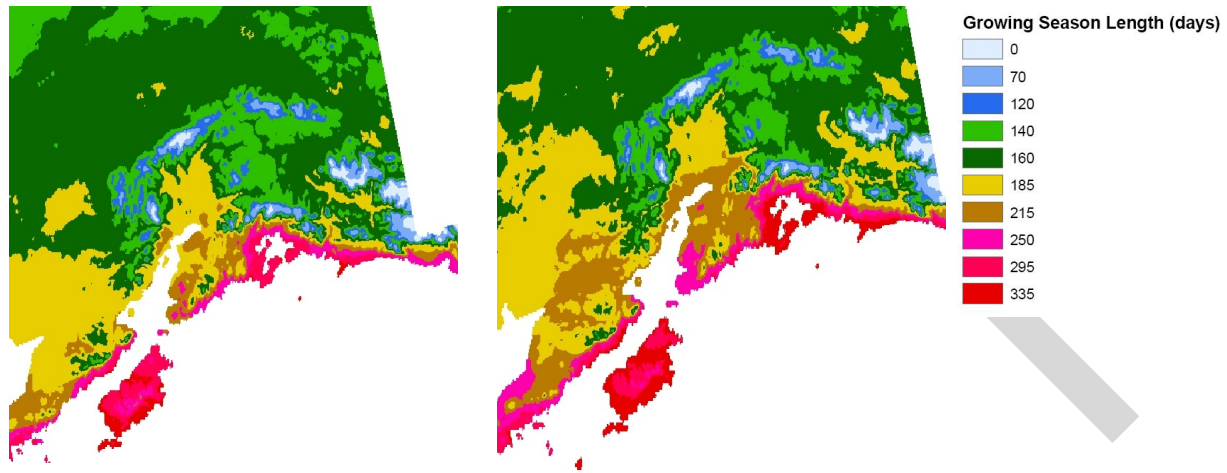


Figure 5. Projected number of warm season days for the current decade (2010-2019) versus the 2040s, defined as days when the mean daily temperature is above freezing. Note that this is a much longer time span than the agricultural “growing season”. (Source: Scenarios Network for Alaska and Arctic Planning, www.snap.uaf.edu).

But warmer temperatures can also create other, more negative impacts. We will likely see an earlier and extended allergy season and an increase in mold, which could trigger asthma and cause respiratory disease for Anchorage residents. Although projections for extreme summer temperatures are low compared to many regions of the Lower 48 states, the lack of air conditioning and acclimation to warm temperatures may result in an increased risk of heat-related illness. Warmer temperatures in Anchorage will likely be more hospitable to invasive “vectors”, such as ticks and mosquitoes, which transmit vector-borne diseases. If these vectors become established, there will be an increased risk that Anchorage residents are exposed to the infective pathogens that cause these diseases.

Warmer temperatures will also impact the health of our forests. A massive spruce bark beetle outbreak began in Southcentral Alaska in 2016, and warmer temperatures in Anchorage support the expansion of the beetle population (See Box 2). Warmer summer temperatures in combination with a large number of dead trees increases the risk of wildfire in the Anchorage area. In addition to the human health impacts of wildfire, such as damage to homes and increased respiratory distress due to wildfire smoke, wildfire events also put stress on the Municipality of Anchorage Office of Emergency Management, Anchorage Fire Department, and many of the social service organizations in the Municipality.

Box 2. Spruce beetle and climate change

Successive years of warm summer temperatures and drier conditions are allowing the spruce beetle to venture farther and farther north.²⁵ Spruce beetles are more likely to infest trees that are damaged or stressed by storms or drought, and warmer temperatures can allow the beetle to transition from a two to one year lifecycle.²⁶ In 2018, U.S. Forest Service surveys identified more than 550,000 acres of tree mortality in Southcentral Alaska due to spruce beetle damage, nearly 50% more than in 2017. Swaths of forest from the central Susitna Valley to northwest Kenai Peninsula are currently affected, including 1,500 acres within the Municipality of Anchorage.²⁷ The last major outbreak of spruce beetle was in the mid-1990s, with over one million acres affected in 1996 alone.²⁸ Find out how identify the spruce bark beetle and how to protect your trees at <http://www.alaskasprucebeetle.org/>.

Because of Anchorage's heavy reliance on fisheries for subsistence, commercial, and sport fishing, as well as tourism, large-scale changes to the Earth's oceans impact Anchorage residents on a local level. We will likely experience more unpredictable salmon returns and similar impacts to other fisheries. Warmer ocean conditions are more suitable for toxin-producing algae that are consumed by shellfish such as razor clams, mussels, and oysters, making them toxic to humans (See Box 3).

Box 3. Shellfish toxins and climate change

Harmful algae can grow when ocean temperatures are warmer than usual. As the climate warms, we expect to see these harmful algae blooms more frequently. These algae produce biotoxins that are poisonous. When shellfish like razor clams, mussels, and oysters eat the toxin-producing algae, the toxin accumulates in their systems and can cause illness or death in humans and wildlife that eat the shellfish. It is important to know where toxic algae blooms have been spotted so that you can be sure that the shellfish you are harvesting are safe to eat. For more information, visit <https://aocs.org/alaska-hab-network/what-are-habs/>.

The expected climatic changes would also impact the habitat of many other animals in Alaska that are important for subsistence and tourism. Scientists expect that many of our coniferous forests will transition to deciduous forests after wildfire events. The geographic range of large animals such as moose and caribou will shift as a result. Additionally, the establishment of invasive parasites can negatively impact animal and human health. The Alaska Department of Fish and Game, the Office of the State Veterinarian, and the University of Alaska Anchorage are currently conducting surveillance for the invasive winter moose tick in Alaska (See Box 4). If this tick species establishes itself in Alaska, it could have a significant impact on our moose population.

Box 4. Winter tick

The winter tick, or moose tick, is a parasite that has been found in many parts of North America, including the Yukon Territory in Canada. These ticks can cause a significant threat to wildlife, particularly moose. Moose cannot remove these ticks during grooming and have been found with heavy infestations of thousands of ticks. These heavy infestations can cause anemia, hair loss, distraction from feeding, and ultimately death. As the climate warms, these ticks may be more likely to survive if introduced into Alaska. The Alaska Office of the State Veterinarian and the Alaska Department of Fish and Game are collaborating with the University of Alaska to monitor and track introductions of new tick species into Alaska. Find out more at <https://dec.alaska.gov/eh/vet/ticks>

²⁵ <http://www.alaskasprucebeetle.org/>

²⁶ <https://www.sciencedirect.com/science/article/pii/S0378112706001599>

²⁷ <https://www.adn.com/alaska-news/2018/06/10/voracious-spruce-bark-beetles-are-back-in-force-in-southcentral-alaska/>

²⁸ <https://www.fs.usda.gov/detailfull/r10/forest-grasslandhealth/?cid=FSEPRD536861&width=full>

Many of the recommendations in the Climate Action Plan address these potential impacts of climate change in Anchorage by creating programs and management strategies that make our residents and ecosystems more resilient. Although our current knowledge of these impacts guided the development of the plan, it is essential that we continue monitoring these impacts so that we can respond quickly and effectively.

DRAFT

Understanding Anchorage's greenhouse gas emissions

Anchorage is currently working on a comprehensive, sector-based greenhouse gas inventory to fully understand local emissions from energy use in our vehicles, homes, and businesses, as well as emissions from materials that are thrown in the garbage. This inventory will be used to refine our emissions reductions targets and track progress towards the goal of reducing local greenhouse gas emissions. Previous efforts to calculate emissions include the Municipality of Anchorage Base Year 2008 Greenhouse Gas Inventory (2009), the Municipality of Anchorage Base Year 2015 Greenhouse Gas Inventory (2017), and the 2017 Anchorage Energy Landscape and Opportunities Analysis. Although each of these studies contribute to our understanding of Anchorage's emissions, each study has limitations. Anchorage needs an updated emissions inventory that breaks out emissions sources by sector and energy type in order to measure progress.

What are the sources of our emissions?

The vast majority of Anchorage's emissions are from transportation and heating and electricity for buildings and industry (Figure 7). Nearly half of Anchorage's greenhouse gas emissions are from transportation. In addition to carbon dioxide (CO₂) emissions, vehicles are also a major source of ambient carbon monoxide in Anchorage. Prolonged vehicle warm-ups and idle times, particularly in the winter, are a substantial source of these emissions.²⁹ Emissions from buildings and industry including heating and electricity used in buildings as well as energy used for industrial processes. Waste emissions come from solid waste and wastewater operations and methane emissions. All sectors must reduce emissions to reach our future goals.

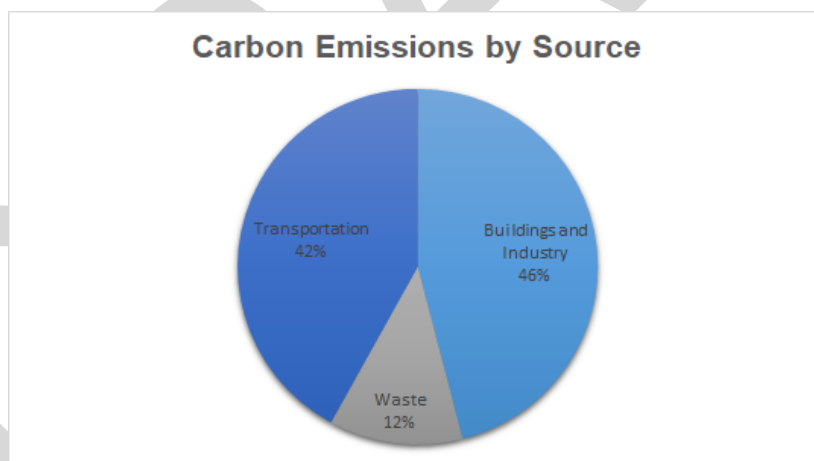


Figure 6. Anchorage greenhouse gas emissions by source. (Source: Shercliffe (2017) Municipality of Anchorage Base Year 2015 Greenhouse Gas Inventory).

Breaking down this electricity use by energy source demonstrates that Anchorage's current energy portfolio is dominated by natural gas. Not only is Anchorage's heat generation almost exclusively from natural gas in residential and commercial buildings, over 86 % of the city's electricity generation is coming from burning of natural gas as well (Figure 8). Anchorage utilities recently invested in two new

²⁹ ADEC. 2013a. Amendments to: State Air Quality Control Plan Vol. II: Analysis of Problems, Control Actions; Section III.B: Anchorage Transportation Control Program. Anchorage CO Limited Maintenance Plan for 2014-2024. Prepared by the Municipality of Anchorage Department of Health and Human Services. Amended April 9, 2013.

natural gas plants, including a 120 MW combined cycle gas plant that produces 30% less CO₂ compared to legacy plants, and a 171 MW natural gas and diesel plant.

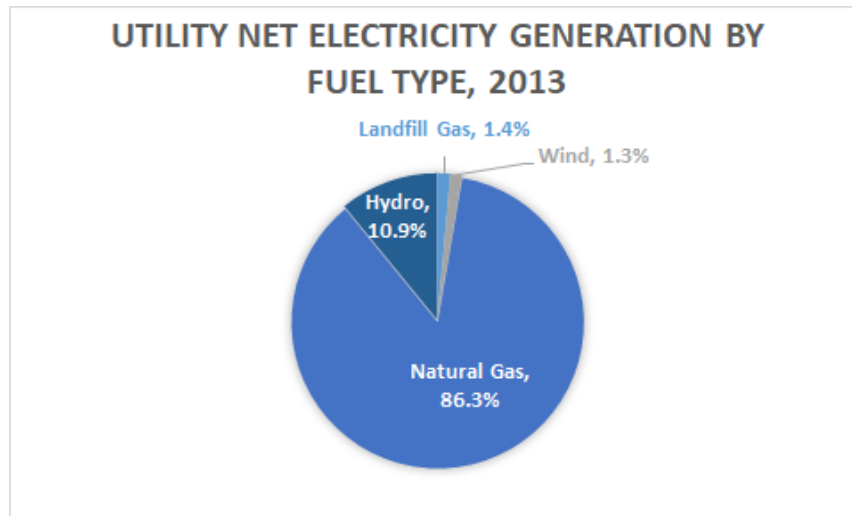


Figure 7. Anchorage electricity generation by fuel type, 2013. (Source: Deerstone Consulting and Crimp Energy Consulting, Anchorage Energy Landscape and Opportunities Analysis (2016).

Over-reliance on one energy source leaves Anchorage vulnerable to price volatility and supply interruptions. Renewable energy sources must be added to the portfolio in order to diversify our energy supply, reduce emissions, improve air quality, and save money on fuel costs.

DRAFT

Who uses energy in Anchorage?

Residents and businesses consume approximately 79% of energy in Anchorage (Figure 9) and could save approximately \$70 million/year through energy efficiency upgrades.³⁰ The Municipal government accounts for five percent of energy used in Anchorage (four percent for buildings and one percent to power streetlights). State, federal, and military consumption accounts for 16%. While many of the actions in the Climate Action Plan address Municipal operations, these figures indicate why collaboration with Anchorage residents and businesses is crucial to the success of the plan. Together, we have the opportunity to drastically reduce Anchorage emissions.

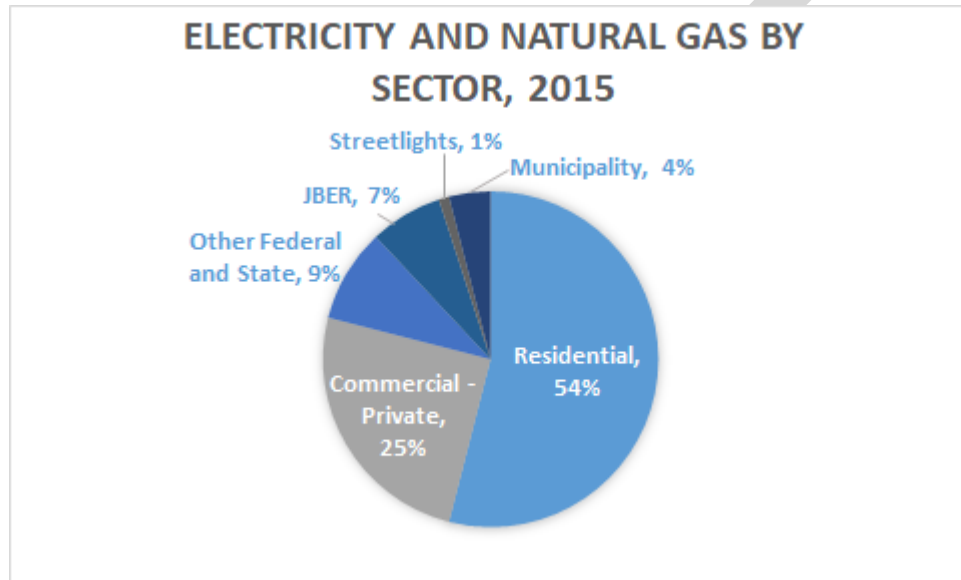


Figure 8. Anchorage electricity and natural gas usage by sector, 2015. Deerstone Consulting and Crimp Energy Consulting, Anchorage Energy Landscape and Opportunities Analysis (2016).

Consolidating energy sources in Anchorage. In Anchorage, a city with the same area as Delaware, one utility provides natural gas and three utilities provide electricity. With a small load (<500 MW of peak demand), this is an inefficient use of resources. Anchorage voters supported the sale of Municipal Light & Power (ML&P) to Chugach Electric Association (CEA) in an April 2018 ballot proposition. When final, the \$1 billion sale will eliminate duplication and allow more efficient operation in Anchorage, opening potential for increased use of renewable resources.

³⁰ Deerstone Consulting and Crimp Energy Consulting (2016), *Anchorage Energy Landscape and Opportunities Analysis*.

Climate action through equity

The Municipality of Anchorage has a bold vision for responding to climate change over the coming decades with an emphasis on equity and inclusion. The success of this vision relies on engagement of our many and diverse communities. This plan is committed to principles of environmental and social justice, guided by the [Jemez Principles for Democratic Organizing](#). Whether we are responding to changes that have already occurred, or reducing greenhouse gas emissions to reduce our contributions to climate change, the Municipality is committed to climate goals that benefit the local environment, lower the cost of living, enhance quality of life and property values, encourage innovation, address economic equity, and make Anchorage a great place to live, work, and play. Anchorage has an opportunity to be a model for other Northern communities.

Anchorage, with a population of nearly 300,000 people, is among the most diverse cities in the United States.³¹ The Anchorage School District reports that 107 different languages are spoken in K-12 schools.³² Likewise, the city has one of the largest percentages of American Indian/Alaska Native populations of any urban center in the United States at 8.8% of the population.³³ Joint Base Elmendorf Richardson (JBER) brings in members of the military and their families to live here.

Embedding equity into the strategies outlined in the plan is vital to building resilience. The most vulnerable members of society disproportionately bear the impacts of climate change and do not share equitably in the opportunities presented by climate-related solutions. When communities are economically and structurally isolated, they are more vulnerable to acute shocks. For example, individuals with limited English language proficiency are less likely to access emergency services and programs that could help during or after an extreme weather event, and socially isolated people may not have a personal network to help them during an emergency. Recommendations in the plan address these challenges.

Actions to mitigate and adapt to climate change have the potential to address and minimize disparities and inequities. For example, energy efficiency actions complement housing affordability goals by reducing energy bills, helping provide renters equal access to energy efficiency upgrades, and increasing job opportunities for energy upgrade work. By advancing equity, we build the capacity of our entire community to respond to a range of challenges and opportunities.

In order to ensure an inclusive planning process in which all Anchorage residents have a chance to influence decision-making processes, we placed a strong emphasis on community engagement. A robust community engagement strategy is critical for ensuring that the Climate Action Plan reflects the values, goals, priorities, and concerns of all Anchorage residents. See pages 81 and 89 for more details about our community engagement process and how community input and equity considerations were incorporated in the Climate Action Plan.

³¹ <https://www.census.gov/quickfacts/fact/table/anchorage municipality alaska county, US/PST045218>

³² "Languages at ASD | Anchorage School District." <https://apps.asdk12.org/aboutasd/languages/>. Accessed 29 Mar. 2018.

³³ <https://www.census.gov/quickfacts/fact/table/anchorage municipality alaska county, US/PST045218>

Terminology

Climate equity ensures that the causes and effects of climate change are addressed through policies and projects that seek to diminish inequalities and equally disperse the benefits to all communities.³⁴

Underserved means people and places that historically and currently do not have equitable resources, access to infrastructure, healthy environments, housing choice, etc. Due to historical inequitable policies and practices, disparities may be recognized in both access to services and in outcomes.

Underrepresented recognizes that some communities have historically and currently not had an equal voice in institutions and policy-making and have not been served equitably by programs and services.

What does it mean to use *equity* as a guiding principle for the Anchorage Climate Action Plan?

- Create a plan that reflects the values, goals, concerns, and innovative ideas of all Anchorage residents.
- Engage residents in decision making processes that impact them.
- Reduce inequities in access to critical services, including health, green jobs, etc.
- Ensure that the costs and benefits of actions outlined in the Climate Action Plan are shared equitably among all Anchorage residents.
- Create opportunities for residents in new economies (renewable technologies, green building, etc.)

³⁴ ICLEI - Local Governments for Sustainability (<https://www.iclei.org/>)

Co-benefits of climate action

A successful Climate Action Plan for Anchorage will benefit the Municipality beyond just responding to climate change. Most, if not all of the actions found in the plan will result in substantial local environmental and community benefits. These additional, positive benefits of climate action are called *co-benefits*. Some of the potential co-benefits of implementing the actions in this plan include:

- Opportunities for community education
- Economic stability
- Enhanced emergency management and response
- Improved infrastructure and public facilities
- Additional transportation options
- More predictable energy supply
- Sustainable natural resources
- Food and agriculture stability

In addition to these potential community-wide benefits, the Anchorage Climate Action Plan specifically highlights the co-benefits of **increased jobs and prosperity, equity, environmental quality, and health**.

The co-benefits of climate action can be felt in residents' daily lives with impacts such as energy savings and improved air quality. Climate action policies in other cities have helped drive innovation by creating a demand for new products, processes and services, delivering economic benefits and enhancing the quality of life of residents.

Climate action supports jobs and prosperity

By taking steps to lower emissions, Anchorage can simultaneously open doors to economic opportunity. In the United States, more than 3.3 million Americans are directly employed by the clean energy industry. According to the U.S. Department of Energy, renewable energy employment alone (excluding efficiency) grew by nearly 18% between 2015 and 2016.³⁵ These improvements come from growing renewable power generation, movement away from fuel sources such as coal, and energy efficiency improvement.

As the largest city in America's Arctic, Anchorage is uniquely poised to develop economic sectors that take advantage of our strategic location and abundance of renewable resources. In addition to growing our economy, identifying and building a renewable energy sector provides more economic opportunities for underemployed and unemployed Anchorage residents who are willing to be trained in these areas.

Climate action improves equity

Climate change is a crisis that disproportionately impacts low income communities and communities of color. Not only do these communities have less resources to adapt to the negative consequences of climate change, historic under-investment in their neighborhoods also means they have less infrastructure like paved alleyways or drainage that could help mitigate flooding due to freeze-thaw events or receiving more winter precipitation as rain. Actions found in the Climate Action Plan have the potential to improve equity within Anchorage by targeting resources and investments to neighborhoods and households that are disproportionately affected by climate impacts. Similarly, mitigation actions related to household energy efficiency measures can lower energy costs in low

³⁵ "Fact Sheet - Jobs in Renewable Energy and Energy Efficiency (2017" 14 Feb. 2017, <http://www.eesi.org/papers/view/fact-sheet-jobs-in-renewable-energy-and-energy-efficiency-2017>. Accessed 29 Mar. 2018.

income neighborhoods, and planting edible landscaping can increase property values, improve quality of life, and improve access to healthy, local food.

Climate action improves environmental quality

Access to our natural environment is one reason why many people choose to live in Anchorage. Many of the actions in the plan will also improve local environmental quality. For example, actions aimed at providing protection from flooding by preserving wetlands also serve to preserve this resource as vital wildlife habitat. Preserving canopy cover and monitoring for invasive species will help protect our forests. Reducing single occupancy vehicle trips will improve air quality. Beyond their outdoor recreation value, our local ecosystems provide services such as storm water retention, cooling, and habitat for many wildlife species that are important subsistence food resources and part of the larger Anchorage ecosystem.

Climate action improves health

Many of the environmental changes associated with climate change in Anchorage will have direct impacts on human health, such as increased wildfire risk and exposure to vector-borne diseases. These impacts are addressed in the Health and Emergency Preparedness chapter (pages 52-60). In addition, many actions in other sectors will also improve health for Anchorage residents. For example, making it more safe and accessible to walk or bike promotes increased physical activity and reduces the risk of crash related injuries. Increased exercise could lead to a decrease in obesity and cardiovascular disease, more social interaction on trails could improve mental health outcomes, and a decrease in car traffic would improve air quality and decrease the incidence of respiratory disease. Increasing community gardens and education about growing and storing food can decrease emissions related to importing food while increasing access to healthy foods.

Climate Action Plan sectors

Key

The objectives and associated actions are grouped into the following sectors:

- Buildings and Energy
- Land Use and Transportation
- Consumption and Solid Waste
- Health and Emergency Preparedness
- Food Systems
- Urban Forest and Watersheds
- Outreach and Education

TERMINOLOGY

“Vision” = A broad statement that describes our desired position by 2050 within each sector.

“Objectives” = Steps towards achieving mitigation targets and adaptation goals by 2030.

“Actions” = Detailed policies, projects and activities to achieve our objectives.

CO-BENEFITS refer to the intended or unintended benefits for the local environment and community as a result of mitigation and adaptation actions that are directed at addressing climate change. The co-benefits column indicates the actions that have the potential for significant, direct co-benefits. For example, actions to reduce the number of cars on the road have environmental quality and health co-benefits because these actions will improve air quality in Anchorage. The co-benefits assessed in this plan include:

- High potential to support jobs and prosperity
- High potential to advance equity
- High potential to improve local environmental quality
- High potential to improve health

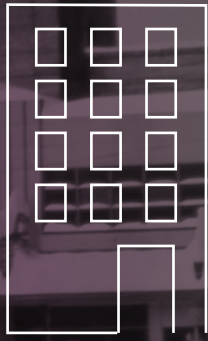
PRIMARY MUNICIPAL LIAISON & POTENTIAL PARTNERS

To assist with implementation and accountability, primary municipal liaisons and potential partners are identified. For Municipality lead actions, the Primary Municipal Liaison is the primary entity responsible for initiating the implementation of the action and reporting on progress. For partner (university and other) lead actions, the Primary Municipal Liaison will be the main point of contact for the Municipality. Successful implementation will often require collaboration and coordination with other departments as well as public and private sector partners.

The full list of municipal departments included in the plan is included in the Appendix.

IMPLEMENTATION TIMEFRAME

- **Near-term** = Plan adoption to June 2020
- **Mid-term** = 2020 to 2025
- **Long-term** = 2026 and beyond
- **Existing and/or ongoing** = currently underway
- **Uncertain** = depends on funding or other factors



BUILDINGS & ENERGY



Buildings and Energy

Alaska is third in energy use per capita in the U.S. While cold temperatures, dark winters, and remote communities contribute to this high energy use, there are many opportunities to decrease the state's energy footprint.

In Southcentral Alaska, three new natural gas plants have been completed since 2013, generating 86% of electricity in Anchorage with the remaining power from wind, hydropower, and landfill gas-to-energy. Heating is also sourced from natural gas through Enstar in Anchorage. These large investments in natural gas inhibit new renewable energy project developments as the energy capacity available on the grid exceeds current demand. Though the increased efficiency of the new plants reduces fuel usage, data-driven collaboration and regional planning with the utilities is critical to moving forward more efficiently.

As noted in the Land Use and Transportation sector, the rise in electric vehicles (EVs) that the Lower 48 is already experiencing will increase electric demand in the near future. The region must plan for that growth and should use this opportunity to increase renewable energy generation. A cleaner fuel mix will provide even greater carbon savings when switching to EVs.

Anchorage has an opportunity to invest locally in sustainable infrastructure, reduce our carbon impact, and attract innovation and investment. Buildings are responsible for nearly half of Anchorage's greenhouse gas emissions.³⁶ Reducing these emissions requires energy efficiency improvements as well as renewable energy generation.

Energy efficiency measures could save approximately \$34 million/year for homes and \$40 million /year for private commercial buildings³⁷. Energy efficiency reduces energy use and costs, improves comfort, and increases the value of our homes and businesses. The necessary technology for reducing energy use is available today. Efficient building design can cost more up front, but with reductions in annual energy costs, energy efficiency has the fastest return on investment compared to any type of energy generation. Barriers to efficiency investments in commercial and residential buildings include lack of knowledge of the cost benefits of efficiency, lack of financing, and the owner/renter disconnect, which creates misaligned incentives. To address these barriers, Anchorage is currently exploring new and creative financing mechanisms such as On Bill Financing, Property Assessed Clean Energy, and a Green Bank.

Alaska has demonstrated the success of investing in energy efficiency and cleaner energy. Mayor Ethan Berkowitz launched the Energy Smart Lighting Initiative to retrofit Anchorage streetlights with LED fixtures. Municipal Maintenance and Operations (M&O) converted 12,000 lights with an estimated annual cost savings of \$780,000. Since 2008, state residential energy efficiency programs have assisted more than 40,000 households in becoming more energy efficient, saving residents an average of 30% on their home energy bills.

Investments in renewable energy will also be an important strategy for decreasing our energy-related greenhouse gas emissions. Solar and battery prices have dropped 80% in the last decade while the cost of wind power is down by more than half. Bradley Lake, a 120 MW hydroelectric project near Homer, was almost rejected due to its initial construction cost. Now, 28 years later, it is still generating electricity and is the lowest cost energy available on the Railbelt grid. The Railbelt refers to the electrical grid that runs from Fairbanks to Homer and includes Anchorage.

³⁶ "Municipality of Anchorage Greenhouse Gas Inventory", August 2017 and "Anchorage Energy Landscape and Opportunity Analysis", May 2017

³⁷ Deerstone Consulting and Crimp Energy Consulting (2016), *Anchorage Energy Landscape and Opportunities Analysis*.

Equity considerations are a key factor for this sector to ensure lower-income residents are not unfairly burdened by changing energy costs or excluded from incentives for energy efficiency or renewable energy. Energy efficiency and renewable energy programs contribute to better air quality and respiratory health, lower energy costs for households and businesses, and result in more dollars reinvested in the local economy. However, if not carefully designed, energy efficiency and renewable energy programs may fail to serve low-income households. Programs need to be designed so that the cost of energy efficiency upgrades or purchasing renewable energy is not prohibitive for some Anchorage households. Similarly, it is important that the cost of home energy efficiency upgrades are not passed onto tenants through higher rental costs without the benefit of lower energy bills.

Some actions with the biggest impact on Anchorage's energy-related greenhouse gas emissions are beyond the jurisdiction of the Municipality of Anchorage. Other statewide developments on the horizon include the establishment of a Railbelt wide "Independent System Operator" (ISO) to lead regional planning efforts, ensure a level playing field for renewable energy generators, and plan for new generation and transmission assets in an efficient and transparent manner.

In order to make Anchorage an attractive place to live, work, and play, the Municipality must create a policy framework that supports clean energy investments. Without action on this front, Anchorage will lose resources to states that are attracting investment and businesses with affordable, reliable, clean energy.³⁸ Additionally, Anchorage will lose the potential savings from increased use of energy efficiency strategies and renewable energy.

³⁸ *Big business sees the promise of clean energy*, The Economist, June 10, 2017, available at <https://www.economist.com/business/2017/06/10/big-business-sees-the-promise-of-clean-energy> (accessed June 23, 2018)

Case Study: Solarize Anchorage

Solarize Anchorage is a community-based solution to reduce the upfront cost of solar photovoltaic (PV) power. The campaign brings neighborhoods together to purchase solar PV panels in bulk and receive a volume discount, making solar PV technology more accessible and affordable for customers. This is an exciting new community-driven program that empowers individuals to participate in clean energy solutions to climate change.

The Alaska Center and the Alaska Center for Energy and Power (ACEP) at the University of Alaska established this program and conducted the first phase of the campaign in the Airport Heights neighborhood in summer 2018. The campaign found great success and community support with 33 participating homeowners and 146 kW total installed capacity. The participants of the first phase of the campaign received the Solarize discount, federal tax credits, and savings through net-metering. The bulk of the savings came from the federal tax credits that are soon decreasing. It is estimated that with a 3kW solar installation will save homeowners \$16,000 over the 25 year projected life of the panels.

In 2019, the Alaska Center expanded the program in Anchorage to include more neighborhoods. Spenard, Turnagain, South Addition, and Rogers Park will all conduct campaigns in their neighborhoods over the summer and into the fall. With ample community interest, the Solarize steering committee is interested in expanding the program to commercial properties and more communities in Anchorage and beyond.

While the increase in solar PV installations is a positive climate action for Anchorage, this development also raises concerns about current *net metering* regulations. Net metering occurs when excess energy produced by a consumer goes back to the electrical grid, offsetting the cost of their energy. In Alaska, net metering is essentially comprised of solar PV installations, with only a handful of other distributed energy generation installations. Since the start of the net metering policy in January of 2010, over 2,200 kW of solar has been installed on the Railbelt grid.

Currently, net metering is allowed for installations up to 25 kW in size, and utilities are mandated by the Regulatory Commission of Alaska to allow net metering on installed capacities equivalent to 1.5% of their respective average loads. However, given current solar PV installation trends, Anchorage utilities are projected to meet this limit within the next several years.³⁹ While local utilities have not indicated a propensity to halt installations after this point, expanding net metering capacity would provide welcome security to both residents and installers alike, and continue to diversify the local energy generation portfolio.

Case Study: Cook Inlet Housing Authority High Efficiency Homes

CIHA was established in 1974 with the goal of providing affordable housing to people in the Cook Inlet region of Alaska. After decades of successfully providing quality, affordable homes to Alaskan families, CIHA is committed to using efficient design and alternative energy systems in their developments for long-term sustainability. For example, one of the affordable senior housing developments is heated through geothermal ground-source heat-pump technology.⁴⁰

³⁹ http://acep.uaf.edu/media/260463/EEM-01255_SolarDesignManual_5thEd201805.pdf (p.33)

⁴⁰ <http://www.cookinlethousing.org/who-we-are/our-story-timeline/>

Buildings and Energy

2050 Vision: Buildings and infrastructure in Anchorage are safe, healthy, and affordable for all and our building practices demonstrate leadership in high latitude climates. Residents, businesses, and organizations have access to affordable clean energy.

Objective 1. Reduce fossil fuel based energy consumption of buildings

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 1A | Explore incentives for energy and water efficiency, storage, and renewable energy (e.g. expedited and express permitting, rebates, property tax incentives, certifications, utility rebates and programs, neighborhood volume discounts such as Solarize and other mechanisms that help ease of purchase) for all residential, commercial, and municipal buildings. | environment, equity, jobs and prosperity | Office of Economic and Community Development (OECD), Office of Energy and Sustainability (OES) | Project Management & Engineering (PM&E), MOA Property Appraisal, Anchorage Home Builders Association (AHBA), Building Owners and Managers Association (BOMA), Anchorage School District (ASD), realtors, contractors, design and construction community, Development Services | Near-term and Ongoing |
| 1B | Establish codes (T21 and T23) that improve energy efficiency and reach for best practices such as Living Building Challenge, Architecture 2030, LEED, Passive House, net zero, etc. for new residential, commercial, and municipal buildings. | equity, jobs and prosperity | OECD, Building Safety, OES, Maintenance and Operations (M&O), Development Services, Permitting, Real Estate Department | PM&E, Alaska Energy Authority (AEA), BOMA, AHBA, Alaska Housing Finance Corporation (AHFC), Cold Climate Housing Research Center (CCHRC), contractors, design community, labor unions, realtors, mechanical engineers | Mid-term |
| 1C | Implement energy performance tracking and an annual reporting program for municipal buildings and commercial and multifamily buildings over 10,000 square feet. Support improved access to utility data for building owners and managers seeking to improve energy and water performance. | | Innovation Team (i-Team), OES, M&O | MOA Finance Department, U.S. Department of Energy, AHFC, AEA, ASD, Anchorage electric and gas utilities | Mid-term |
| 1D | Develop a program to facilitate cost-saving building tune-ups for commercial and municipal buildings in order to ensure optimal operation. | environment, jobs and prosperity | OECD | PM&E, MOA Finance Department, BOMA, ASD, design and construction community | Mid-term |
| 1E | Work with community-based organizations on a workforce development program for high efficiency siting and building design and construction. | equity, jobs and prosperity | OECD | ASD, King Technical High School, UAA, Alaska Native Science & Engineering Program (ANSEP), Renewable Energy Alaska Project (REAP), Alaska Department of Labor and Workforce Development, Alaska Vocational Technical Center (AVTEC), design and construction community, labor unions, community centers | Mid-term |

| | | | | | |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------|
| 1F | Require energy audits and implementation of cost effective energy efficiency measures with MOA facilities with priority on highest energy consuming facilities. | environment, health, jobs and prosperity | OES, M&O, Municipal Manager | MOA Finance Department, MOA Office of Management and Budget (OMB), ASD, AHFC, AEA, BOMA | Mid-term |
| 1G | Develop an energy and water use guide for Municipal employees. | environment, health | OES | M&O, AHFC, CCHRC | Near-term |
| 1H | Finish changing out of all MOA streetlights / trail lights to LEDs and more efficient lighting controls. | environment | M&O, Parks and Recreation (P&R), Traffic Department, ML&P | Chugach Electric Association (CEA), Matanuska Electric Association (MEA), ASD, AHD | Near-term to Mid-term |
| 1I | With a focus on low income households and renters, engage residents on low cost ways to save energy and money, such as installing programmable thermostats. | environment, health, equity, jobs and prosperity | OES, P&R, ML&P, Anchorage Health Department | CEA, MEA, ASD, AEA, AHFC | Near-term to Mid-term |

Objective 2: Expand local renewable energy generation and use.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------|------------------------------------------------------------------|-----------|
| 2A | Complete investigation of policy mechanisms to reduce emissions and provide specific recommendations (e.g., energy storage targets, tax incentives, etc.). | | OES | OMB, MOA Finance Department, OECD | Near-term |
| 2B | Per Action 2A, implement local policy recommendations and advocate for policy recommendations at the State level. | environment, health, equity, jobs and prosperity | Office of the Mayor, OES, OECD | Anchorage Assembly | Mid-term |
| 2C | Establish a municipal level renewable energy and energy efficiency target so that the electricity and heating needs of the MOA and school district are supplied by specified percentages of renewable energy or energy efficiency mechanisms. | environment, health, jobs and prosperity | Office of the Mayor, OES, OECD, M&O | ASD, CEA, ML&P, MEA, Planning Department, Anchorage Assembly | Near-term |
| 2D | Explore ways to incentivize distributed renewable energy generation and energy storage projects. | jobs and prosperity, environmental, health | OECD, OES | Private entities with high energy use, clean energy businesses | Mid-term |
| 2E | Quantify potential cost savings and emissions reduction through electrification of sectors (conversion to ASHPs, Electric Vehicles, heat pump water heaters, etc.). | | OES | AEA, AHFC, Anchorage electric utilities, builders and developers | Near-term |
| 2F | Explore internal operational and efficiency and savings opportunities such as those outlined in the | | Solid Waste Services (SWS) | AWWU, ML&P, M&O, ASD, OECD | Ongoing |

| | | | | | |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----|----------------------------------------------------------------------------------------|---------|
| | 2017 Anchorage Energy Landscape and Opportunities Analysis, including heat recovery, waste to energy, gasification, landfill methane recovery, and combined heat and power. | | | | |
| 2G | Review the solar process including permitting, and planning, zoning and development regulations to identify and reduce barriers to installing solar through the National Solsmart designation program. | jobs and prosperity | OES | Planning Department, Permitting Department, OECD, solar installers, electric utilities | Ongoing |

Objective 3. Use existing and innovative financing mechanisms to encourage clean energy and energy efficiency within the municipality.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 3A | Establish Municipal-level financing mechanisms to encourage clean energy and water efficiency projects and programs. Identify and support financing mechanisms at the state and/or federal level (e.g. green bank, C-PACE, on-bill financing). | | OECD, OES | AEA, American Institute of Architects (AIA), AHBA, Association of Alaska Housing Authorities, Connecticut Green Bank, lenders, private banks, Anchorage electric and gas utilities | Near-term |
| 3B | Work with AHFC and other 3rd party commercial lenders to access currently available financing for public building energy retrofits. | | OES, OECD | M&O, P&R, ASD, AHFC, Alaska Department of Transportation and Public Facilities (AK DOT&PF) | Near-term |

Objective 4: Establish a robust administrative structure to implement this plan reliably over time.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|---------------------------------------------------------------------------------------------------|-----------|
| 4A | Work with the State of Alaska to create a Unified System Operator for the Railbelt to provide regional planning, improve system efficiency and increase opportunities for Independent Power Producers. | environment, health | Office of the Mayor | Regulatory Commission of Alaska (RCA), Alaska State Legislature, AEA, Railbelt electric utilities | Near-term |
| 4B | Recommend that utilities allow all customers to opt in to pay for a higher percentage of renewable energy. | | Office of the Mayor, OES | Office of the Mayor | Near-term |
| 4C | Evaluate a carbon pricing mechanism to account for the externalities of fossil fuels. | | Office of the Mayor, OES | State of Alaska, Alaska Energy Authority | Near-term |
| 4E | Advocate for a Railbelt Renewable Portfolio Standard requiring a certain portion of energy to come from renewable energy sources in Alaska. | | Office of the Mayor | REAP, Anchorage electric utilities | Near-term |
| 4F | Explore and contribute input toward discussion of increasing the Railbelt net metering cap of 1.5% of utilities' average annual load. | | Office of the Mayor | REAP, Anchorage electric utilities, renewable energy businesses | Near-term |



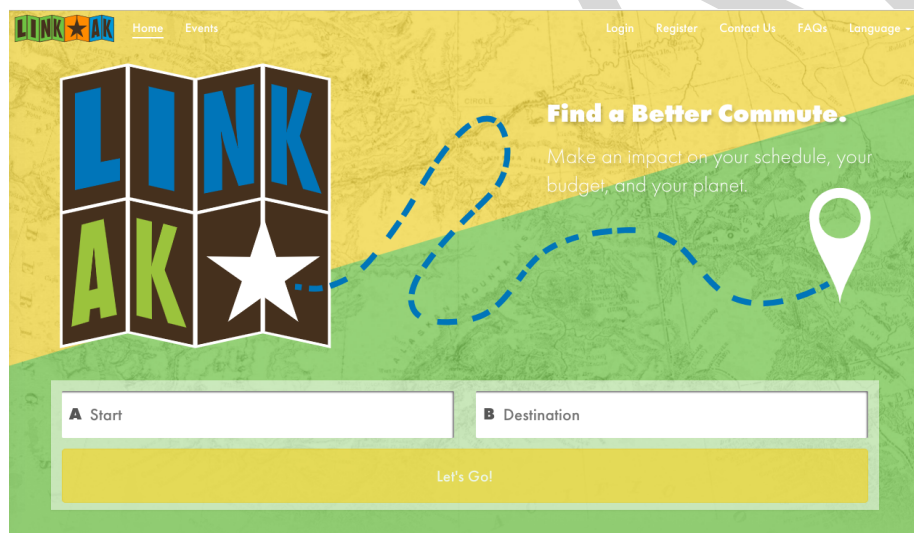
LAND USE & TRANSPORTATION

Land Use and Transportation

In 2017, for the first time in 40 years, the largest source of greenhouse gas emissions in the United States wasn't electricity production but transportation – cars, trucks, planes, trains and shipping. Transportation emissions currently account for 47% of all the greenhouse gas emissions produced in Anchorage and highway motor fuel accounts for 53% of end use energy consumption.^{41,42} An estimated 14,000 to 50,000 commuters drive from the Matanuska-Susitna Borough to Anchorage daily, a 45-mile or longer trip one-way.^{43,44}

According to the recent United Nations Intergovernmental Panel on Climate Change (IPCC) report⁴⁵, decarbonizing the transportation sector requires electrifying vehicle fleets, shifting mobility choices from low- to high-efficiency modes, and transforming urban planning to curtail sprawl and make walking, biking, and transit use easier. Technology-focused measures, such as improving energy efficiency and switching fuel sources, are prominent in scientists' best roadmaps for mitigating transportation emissions. Structural and behavioral changes, namely "the switching of passengers and freight from less- to more-efficient travel modes (e.g. cars, trucks and airplanes to buses and trains)," will be critical, too.⁴⁶

The solutions for curbing vehicle emissions in Anchorage are clear: use less gasoline and diesel fuel. Following the IPCC recommendations, Anchorage can accomplish this by shortening the distances people travel every day, reducing the number of vehicle trips taken each day, increasing the use of non-motorized transportation and public transit, and encouraging the adoption of electric vehicles.



Tools such as LinkAK are available to Anchorage residents to compare travel modes by greenhouse gas emissions, calories, and cost.⁴⁷

As the climate continues to warm, adaptation solutions will be necessary to address the wear and tear on infrastructure caused by more frequent freeze-thaw cycles, icier roads and sidewalks, and more

⁴¹ Municipality of Anchorage Greenhouse Gas Emissions Study, 2015 Report

⁴² Anchorage Energy Landscapes and Opportunities Analysis, 2017

⁴³ <https://www.muni.org/Departments/OCPD/Pages/transportation.aspx>

⁴⁴ <https://www.ktva.com/story/37229388/task-force-to-study-commuter-rail-between-anchorage-mat-su>

⁴⁵ <https://www.ipcc.ch/sr15/>

⁴⁶ <https://www.citylab.com/transportation/2018/10/un-climate-report-transportation-choices/572494/>

⁴⁷ <https://linkak.org/#/>

frequent flooding. There will also be benefits, such as decreased studded tire wear on the roads as the winter season is shortened at both ends. Some adaptation efforts are already being examined by the State and Municipality, such as modifying Anchorage's standards for storm drain infrastructure.

Smart growth policies that curb urban sprawl contribute to both mitigating and adapting to climate change. Smart growth strategies bring environmental benefits, such as improved air quality, and save people money on transportation costs. Anchorage can pursue policies right away to achieve these goals. Land use planning that encourages mixed-use development and affordable housing options close to Anchorage's commercial centers will decrease travel distances for Anchorage workers. Building non-motorized infrastructure and investing in a robust bus system will create alternatives to single occupancy vehicle trips. Investing in public transportation makes commuting alternatives like van rideshares, carpooling, and even light rail more realistic and viable for Anchorage workers who live in the Mat-Su Borough. Replacing vehicles in the Municipal fleet with electric vehicles and investing in charging stations will reduce emissions and provide the infrastructure to encourage residents to buy electric vehicles.

In January 2019, Anchorage Community Development Authority installed an electric vehicle charging station in an EasyPark garage in downtown Anchorage. The charging station will be free to use through the end of 2019. (Credit: EasyPark Alaska)⁴⁸



Achieving equity in land use planning and transportation is a central goal of this plan. Pedestrians and People Mover passengers in Anchorage are predominantly from Anchorage's low-income neighborhoods. Minority populations are overrepresented in Anchorage transit usage statistics. Conversely, amenities for bike commuting, such as workplaces that allow for reliable and secure bike storage, are more frequently available to comparatively affluent cyclists. In addition, high average home prices in Anchorage, particularly in neighborhoods close to downtown and other commercial centers, make it difficult for Anchorage residents to live close to their workplaces. Development policies that address these equity issues are essential for making Anchorage a more walkable,

⁴⁸ http://www.easyparkalaska.com/latest-news/19-01-02/Downtown_Anchorage_Receives_Its_First_Electric_Vehicle_Charging_Station.aspx

bikeable, and livable community with a sense of place that reflects the diversity of Anchorage's residents.

As in other sectors, some adaptation and mitigation actions of the Land Use and Transportation sector that will impact Anchorage are not under the jurisdiction of the Municipality, and require legislative advocacy at the state and federal level.

Case Study: AMATS Passes Complete Streets

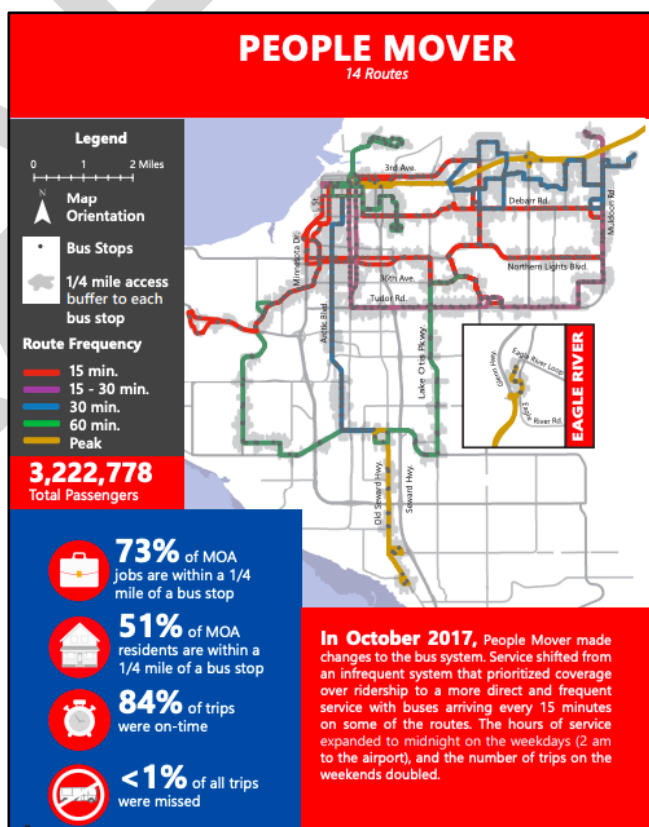
The Anchorage metropolitan planning organization, Anchorage Metropolitan Area Transportation Solutions (AMATS), passed a "Complete Streets" policy in 2018. Complete Streets is a policy to govern project planning and engineering standards, expanding the focus of street and roadway design from just cars to all users. By taking into consideration the needs of pedestrians, bicyclists, motorists, and transit riders, the new program will increase safety, lower congestion, and provide better alternative modes of transportation.

Case Study: Anchorage People Mover

Before the new bus system, People Mover had grappled with declining weekday ridership. In 2015, average weekday ridership was down 5.5% from 2014. In 2016, it decreased by 5.9%. In the first 10 months of 2017 - before People Mover implemented the new bus system - ridership had decreased by 3.9%.

During the first year of the new bus system, weekday average ridership decreased by just 1.9%. That's significantly less than what was projected. Saturday average ridership decreased 3.0%, while Sunday average ridership increased 17.2%.

The Municipality is tracking ridership metrics and adjusting the People Mover routes as necessary to meet community needs. For example, People Mover includes neighborhood routes as a mechanism to help people within some neighborhoods access the more frequent, standard routes. Initially, the neighborhood and commuter routes were not on-time as consistently as the frequent, standard routes. People Mover then made changes to Routes 21 and 31. Additionally, the Route 11 was split into two routes on July 2, 2018: Routes 11 and 41. This helped improve overall on-time performance.⁴⁹



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Land Use and Transportation

2050 Vision: Anchorage will have walkable, well-designed, and connected neighborhoods that employ mixed-use development and diverse transportation options while celebrating our unique cultures and communities.

Objective 5. Make Anchorage a more livable community by increasing convenience and safety.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 5A | Align Title 21 with the 2040 Land Use Plan and Metropolitan Transportation Plan 2040 goals. | | Planning Department | Anchorage Assembly, Planning and Zoning Commission, developers | Ongoing |
| 5B | Determine a target for infill development (the use of land within a built-up area for further construction) and redevelopment in commercial and residential centers. | environment, health | Planning Department | Anchorage Assembly, Planning and Zoning Commission, MOA Real Estate Department, developers | Ongoing |
| 5C | Amend zoning code to allow mini city centers in neighborhoods in order to create more walkable/bikeable communities. | | Planning Department | Office of Energy and Sustainability (OES), Project Management and Engineering (PM&E), Office of Economic and Community Development (OECD), Traffic Department | Ongoing |
| 5D | Prioritize and conserve green spaces in transportation, development, and planning projects equitably across Anchorage. Increase incentives for developers to design in-fill projects that prioritize existing green space (Urban Forests and Watersheds Action 21C). | environment, health | Project Management and Engineering (PM&E), Planning Department | Anchorage Metropolitan Area Transportation Solutions (AMATS), Traffic Department, Parks & Recreation (P&R) | Mid-term |
| 5E | Adopt a Complete Streets policy for all MOA transportation improvement projects to parallel the AMATS Complete Streets Policy. | environment, equity | OECD | Anchorage Assembly, PM&E, AMATS, Planning Department, nonprofits | Mid-term |
| 5F | Increase capacity of Maintenance & Operations Department to address with unpredictable winter weather conditions, including rain on snow events. This includes both winter road maintenance and summer repairs. | health | Maintenance & Operations (M&O) | Traffic, AMATS, Public Transportation Department (PTD), P&R, Alaska Department of Transportation and Public Facilities (AK DOT&PF) | Mid-term |
| 5G | Invest in safe and covered bus stops with benches. Prioritize winter maintenance so that residents can easily access bus stops. | health, equity | PTD | Planning Department, APD, M&O (Street Maintenance) | Mid-term |

Objective 6. Reduce Single Occupancy Vehicles (SOV) trips.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 6A | Develop a Short-Range Transit Plan informed by a public transportation feedback survey to expand frequency, connectivity, and coverage of the public transportation system. | equity, jobs and prosperity | PTD | Valley Transit, AMATS | Near-term |
| 6B | Expand participation in the Employer Sponsored Pass program for workplaces to purchase bus passes for employees, students, etc. | equity | PTD | Planning Department, large employers | Uncertain |
| 6C | Promote the reduced fare program on People Mover and create youth (under 18) ride free. | equity | PTD | Anchorage School District (ASD), University of Alaska Anchorage (UAA), Youth Advisory Commission, local businesses, nonprofits | Near-term |
| 6D | Explore opportunities for increasing public transit commuter options between the Mat-Su Valley and Anchorage. | health, jobs and prosperity | PTD | OES, OECD, Planning Department, AMATS, Valley Transit, Alaska Railroad, Mat-Su Borough, Palmer, Wasilla | Mid-term |
| 6E | Encourage carpooling and transit use by improving coordination and developing strategies with other agencies (e.g. using Link AK, creating carpool lanes, developing workplace incentives, addressing logistical challenges such as finding people who have similar travel needs). | Jobs and prosperity | PTD | Anchorage Health Department (AHD), M&O, AMATS, PM&E, large employers (including MOA, State of Alaska, Mat-Su Borough) | Uncertain |
| 6F | Continue to expand and connect non-motorized transportation facilities. Quickly fund and implement policies and projects recommended by the Anchorage Non-Motorized Plan, such as secure and covered bike storage options. | health, equity | AMATS, PM&E, Traffic Department | Bike Anchorage, Anchorage Park Foundation, AK DOT&PF, M&O, PTD, Anchorage Police Department (APD), P&R, Federation of Community Councils (FCC) | Ongoing |
| 6G | Make it easier for people to walk or bike by improving coordination and developing strategies with other agencies (e.g. lighting, winter maintenance of sidewalks, bike trails and lanes). Prioritize safe routes to school to improve access and appeal of neighborhood schools. | health, equity | AMATS, PM&E, Traffic Department | AK DOT&PF, PTD, M&O, P&R | Near-term |
| 6H | Support the mode share targets in the 2040 Metropolitan Transportation Plan and create a mode share (percent of travelers using a particular transportation type) tracking method. | | PTD, Traffic Department | AMATS, AHD | Ongoing |
| 6I | Promote the social benefits and importance of reducing carbon emissions through the use of transportation | health | AHD | Bike Anchorage, PTD, OES | Near-Term |

| | | | | | |
|--|-----------------------------------------------------------------------------------------------------------|--|--|--|--|
| | modes other than single-occupancy vehicles (e.g. creating a Bus to Work Day, expanding Bike to Work Day). | | | | |
|--|-----------------------------------------------------------------------------------------------------------|--|--|--|--|

Objective 7. Reduce carbon emissions in the transportation sector.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 7A | Conduct a municipal fleet inventory and develop a procurement policy to incorporate EVs through right-timing purchases with a planned vehicle-replacement schedule. | | OES | Purchasing and Finance Departments, Large MOA fleets: Anchorage Fire Department (AFD), APD, Solid Waste Services, Anchorage Water Wastewater Utility (AWWU), M&O, Municipal Light & Power (ML&P) | Mid-term |
| 7B | Monitor economic viability of transitioning public transit fleet (e.g. People Mover and Anchor Rides) to electric or other alternative fuel vehicles. | health | PTD, OES | MOA Finance Department, OECD | Ongoing |
| 7C | Cycle out ASD engines or buses that are over 20 years old. Require similar standards from leased buses. | health | OES | ASD | Near-term |
| 7D | Work with utilities, city and borough planners, and other stakeholders to develop an Electric Vehicle Infrastructure plan for the highway corridor from Fairbanks to Homer to Glennallen, with a focus on the Valley to Anchorage commuters. Apply for Volkswagen settlement funding through Alaska Energy Authority to begin phase I implementation of the plan. | health, Jobs and prosperity | OES | Planning Department, AMATS, AK DOT&PF, Fairbanks Metropolitan Area Transportation System, AK Department of Environmental Conservation, regional and local planning depts. along the corridor, Renewable Energy Alaska Project, Railbelt electric utilities, Anchorage Community Development Authority (ACDA) | Near-term |
| 7E | Support the development of low-carbon transportation fueling infrastructure for fleets and the general public. | health | OES | M&O, OECD, Anchorage electric utilities, ACDA | Uncertain |
| 7F | Support electric car charging station infrastructure in new commercial and multifamily housing during initial construction phase by laying conduit for charging stations and right sizing electrical panels. | equity | Planning and Permitting Departments | Anchorage electric utilities, ACDA | Mid-term |
| 7G | Support enforcement of existing Idle Free Zones and explore opportunities for expanding the number of zones. | health | APD | AHD, ASD | Near-term |



CONSUMPTION AND SOLID WASTE



What can we do to decrease the amount of solid waste going to our landfill?

Introduce food recycling to feed pigs & chickens

Knowledge of Trash pick up 2 times week instead of 4 times, Recycling cut ours to 2 times + more could answer the question

Zero WASTE CHALLENGES @ School + @ Home

Ability to use (re-usable) dishes
Plaint

Create community Composting

create new regulations especially working with local grocers + food producers to create bulk shopping w/o use of plastic.

yes!

Partner w/ ASD student nutrition - so much waste in school lunch programs and some of it is mandated in rules - need changes

UPCYCLE

turn it into fuel.

ethanol & methane

concentrates for commercial recycling, get the biggest producers

more bulk food stores BYO - containers

Composting Bins. Recycling Bins for everywhere

Give tax break to those who pay to recycle

Work with business to create more products

Home recycling at NO COST

RECYCLE, REUSE, REPAIR

GLASS People should recycle stuff and can stuff.

Ban all styrofoam!

Charge for plastic bags at grocery

ALLOCATE % of fees for deposit charge for glass, plastic, etc.

Consumption and Solid Waste

Solid waste poses many environmental challenges in Anchorage. The Anchorage Regional Landfill, the only municipal solid waste landfill in Anchorage, is a finite resource with approximately 35 years of capacity remaining.⁵⁰ Additionally, solid waste collection and disposal generates greenhouse gas emissions as a result of the operation of heavy equipment and vehicles.

In Anchorage, approximately 1,200 tons of waste is disposed of each day. On average, residents throw away 5-6 pounds of garbage every day, which is higher than the national average of 4.4 pounds of waste generated per person.^{51,52}

Efforts to use alternative fuels like biodiesel and the electrification of the solid waste collection and disposal fleet will help to offset greenhouse gas emissions. Construction of a new Central Transfer Station will reduce miles driven by the refuse collection fleet, which will also reduce overall greenhouse gas emissions.

Less than 20% of all materials in Anchorage get recycled. Increasing recycling outreach and education would increase interest in recycling and allow for targeted messaging. Other options to increase recycling include efforts to keep materials out of the landfill with surcharges or other restrictions at the point of disposal, opportunities for multifamily housing, and incentives for businesses. The new Central Transfer Station also helps to make waste diversion opportunities (e.g. recycling, organics collection) more accessible to Anchorage residents.



Anchorage School District/Alaska Waste/Solid Waste Services School Recycling Coordinator
Through a grant from the Municipality of Anchorage Solid Waste Services Department, and Alaska Waste, ASD has established mixed paper recycling at its 95 schools and five administrative buildings. The primary goal of the Recycling program at ASD is to increase education and recycling rates while maintaining an environmentally responsible school district.⁵³

Organics collection is building momentum in the city, with private businesses in Southcentral Alaska showing renewed interest in accepting organic materials for composting. Solid Waste Services has piloted a household composting project to test community interest in composting. There is widespread community interest in more organic material collection.

⁵⁰ Anchorage landfill closure clock: <https://acak.statwindow.com/landfill>

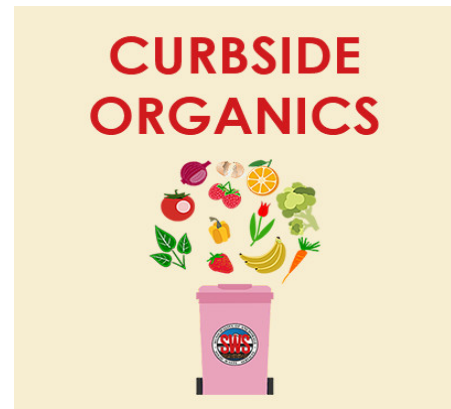
⁵¹ <https://acak.statwindow.com/measures/d3bb5dc5-6de5-46ea-b145-81a9c0066d5b> (Anchorage average)

⁵² <https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/> (National average)

⁵³ <https://www.asdk12.org/recycling>

SWS Residential Curbside Organics Collection Pilot Project

Every week SWS will collect yard waste and food scrap materials from residents participating in the program. As part of the program, residents can use their buckets to collect free compost at the Central Transfer Station and Anchorage Regional Landfill.⁵⁴



Solid waste can also be considered an energy resource. The landfill gas-to-energy plant at the Anchorage Regional Landfill provides additional power to Joint Base Elmendorf-Richardson and reduces the Municipality's overall greenhouse gas emissions. Additionally, SWS will construct landfill leachate evaporators to run off the excess gas, reducing the leachate that must be hauled off for disposal and utilizing gas that is currently being flared. Development of anaerobic digestion or mass burn waste-to-energy facilities are other options that could reduce landfill dependence and provide additional benefits like compost, biogas, and electricity.

Anchorage recently passed a plastic bag ban that prohibits distribution of disposable plastic shopping bags. Similar laws and policies could help lower waste generation in the city. Options include modifying food codes to allow for reusable containers for take-away, extended producer responsibility laws, and policies that support zero waste principles and practices.



Case Study: Anchorage Landfill Gas-to-Energy Project

Through a partnership between the Municipality of Anchorage Solid Waste Services and Doyon Utilities, landfill gas at the Anchorage Regional Landfill, a byproduct of waste decomposition, produces 7 Megawatts of energy to Joint Base Elmendorf-Richardson (JBER). This energy meets the off-peak demand of the Fort Richardson side of the base.⁵⁵

⁵⁴ <https://www.muni.org/Departments/SWS/Recycling/Pages/CurbsideOrganics.aspx>

⁵⁵ <https://www.muni.org/Departments/SWS/Pages/AnchLandfillGastoEnergyPrj.aspx>

Consumption and Solid Waste

2050 Vision: Anchorage has an efficient and innovative solid waste management system that promotes sustainable consumption, recycling and waste reduction.

Objective 8. Restructure waste diversion methods.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 8A | Generate and enact policy (internal and external to MOA) to increase diversion, including policies that look 'upstream' like Extended Producer Responsibility (EPR). | environment | Solid Waste Services (SWS) | Office of the Mayor, Anchorage School District (ASD), private waste haulers, private sector | Mid-term |
| 8B | Create ordinance so waste haulers can incorporate progressive Pay-As-You-Throw (PAYT) residential trash rates. | environment, jobs and prosperity | Office of the Mayor | SWS, Anchorage Assembly, Regulatory Commission of Alaska, private waste haulers | Mid-term |
| 8C | Require mandatory residential curbside recycling. | environment | SWS | Anchorage Assembly, private waste haulers | Long-term |
| 8D | Assess/ expand/ improve infrastructure for recycling and organics collection and processing. | environment, jobs and prosperity | SWS | Anchorage Recycling Center, Alaskans for Litter Prevention and Recycling (ALPAR), private waste haulers, recycling and commercial reuse companies, local grocery stores | Mid-term |
| 8E | Increase recycling surcharge on landfill fees to develop more recycling programs and expand education and outreach efforts. | environment, jobs and prosperity | SWS | Anchorage Assembly, private waste haulers | Near-term |
| 8F | Offer more recycling options for multi-family residences. | environment, equity | SWS | Planning Department, MOA Code Enforcement, housing providers | Mid-term |

Objective 9. Capture potential energy in collected refuse.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|--------------------------------------------------------------------------------------|----------------------------------|---------------------------|-----------------------------------------------------------------------|----------|
| 9A | Develop Leachate Evaporator with excess landfill methane to reduce leachate hauling. | environment, jobs and prosperity | SWS | Doyon Utilities, Anchorage Water and Wastewater Utility (AWWU), JBERR | Mid-term |

| | | | | | |
|----|---------------------------------------------------------------------------------------------------------------------|----------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 9B | Identify and implement additional means of energy collection from solid waste (e.g. organics digestion, mass burn). | environment, jobs and prosperity | SWS | Alaska Waste, Alaska Energy Authority, AWWU, Central Environmental Inc., Anchorage electric utilities, local compost makers, entrepreneurs | Mid-term |
|----|---------------------------------------------------------------------------------------------------------------------|----------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------|----------|

Objective 10. Educate and engage residents and businesses to encourage waste reduction and diversion.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 10A | Expand consumer education (e.g. host community forums) on sustainable consumption and materials management, including recycling. | environment | SWS | ASD, AK Department of Environmental Conservation (AK DEC), ALPAR, Green Star, nonprofits, private waste haulers | Near-term |
| 10B | Provide outreach and education to Anchorage businesses in reducing greenhouse gas emissions through their supply chains. | environment | Office of Economic and Community Development (OECD) | SWS, ALPAR, Green Star, nonprofits, shipping companies, local and national businesses | Near- to Mid-term |
| 10C | Conduct a literature review of incentive/disincentive programs for the community and businesses that have been successfully implemented in other cities. | | SWS | ASD, Anchorage Health Department, UAA | Near-term |
| 10D | Support collaborative consumption community projects, such as neighborhood compost projects, tool libraries, and repair cafes through mini-grant programs (See Food Systems Action 20A). | environment, equity | SWS | The Alaska Center, ALPAR, Green Star, Church of Love, Alaska Master Gardeners, Off the Chain, private waste haulers, zero-waste advocates | Near- to Mid-term |
| 10E | Provide reduce / recycle marketing and signage at store fronts, in parking lots, at point-of sale, on MOA websites, in local papers, on TV, etc. | | OECD | SWS, Traffic Department, local businesses | Near-term |

Objective 11. Create and implement waste reduction targets across Municipal operations and for the broader Anchorage community.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|-----------------------------------------------------------|-----------|
| 11A | Create sustainability liaisons in all municipal departments who will coordinate recycling and other sustainability measures. | environment | OECD | SWS | Uncertain |
| 11B | Generate and enact waste reduction and diversion policies within the MOA aligned with zero-waste practices. | environment, equity | SWS | SWS, Maintenance and Operations (M&O), Anchorage Assembly | Near-term |

| | | | | | |
|-----|----------------------------------------------------------------------------------|-------------|-----|--------------------------------------------------------------------------------------------|----------|
| 11C | Establish community-wide waste reduction targets based on waste trends analysis. | environment | SWS | Port of Alaska, OECD, AK Department of Transportation & Public Facilities (AK DOT&PF), UAA | Mid-term |
|-----|----------------------------------------------------------------------------------|-------------|-----|--------------------------------------------------------------------------------------------|----------|

Objective 12. Optimize refuse collection and disposal systems.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|-------------------------------------------------------------------------------------------------------------------|------------------------------------------|---------------------------|---------------------------------------------------------|-----------|
| 12A | Optimize the efficiency of solid waste collections and transfer routes. | environment | SWS | Commercial haulers | Near-term |
| 12B | Deploy alternative fueled vehicles – biodiesel/electric vehicles used in solid waste collection and disposal. | environment, health, jobs and prosperity | SWS | Alaska Waste, local fuel vendors, private waste haulers | Near-term |
| 12C | Expand diversion opportunities for Anchorage by building a new Transfer Station. | environment, jobs and prosperity, equity | SWS | Commercial haulers | Mid-term |
| 12D | Implement improved leachate management at Anchorage Regional Landfill by deploying stormwater diversion measures. | environment | SWS, AWWU | JBER, UAA, AK DEC | Near-term |



HEALTH AND EMERGENCY PREPAREDNESS

Health and Emergency Preparedness

Climate change is already affecting the health, safety, and the general well-being of Anchorage residents. We are experiencing more winter days that hover around freezing, and summers that are longer. The effects of these environmental changes on health can be negative and positive. Winter freeze-thaw cycles bring flooding, road accidents, and hospitalizations from slips and falls, but longer warm seasons provide additional opportunities for outdoor recreation. Warmer summers have resulted in poor conditions for alpine berries, but also longer seasons for community gardeners and farmers.

In this section on Health and Emergency Preparedness, connections are made between climate and health in Anchorage, as well as emerging issues for emergency preparedness. The actions in this sector include strategies to 1) reduce health and safety impacts of climate change, 2) increase household and community resilience, 3) engage diverse communities in climate change resilience planning, and 4) develop research and monitoring programs to support our understanding of and planning for the health and safety impacts of climate change in Anchorage.

Health impacts of climate change in Anchorage

Climate change impacts the health of Anchorage residents in many ways. As the spring and summer gets warmer and wetter, there could likely be an increase in mold, and the allergy season could begin earlier and last longer. The result is that Anchorage residents with asthma, allergies, or other chronic conditions may experience an increase in respiratory disease.

The impacts of climate change on Anchorage's food supply are complex and are addressed more fully in the Food Systems section. In terms of personal nutrition, subsistence foods such as berries, salmon, and moose are an important part of the diet for many Anchorage residents. Temperature and precipitation changes across Alaska will likely impact the location and quality of habitat for many large game animals. Similarly, large scale changes to ocean ecosystems mean that salmon runs are more unpredictable and other fisheries become more variable. Ecological changes associated with climate change are creating ocean conditions that support harmful algal blooms (HABs). HABs are made up of algae that produce toxins. When shellfish eat these toxins, they become toxic to humans. When human eat contaminated shellfish, the toxins can cause death very quickly if the person's chest and abdomen muscles become paralyzed.

Ecological changes associated with climate change has also increased wildfire risk in the Anchorage area. Wildfire events in Anchorage threaten homes and property, and increase respiratory distress due to wildfire smoke. Four of the ten largest fire seasons on record in Alaska have occurred in the past decade.⁵⁶

Warmer summers and milder winters also make Anchorage more hospitable for vectors such as non-native mosquitoes and ticks. These vectors can carry pathogens that cause vector-borne diseases. Two species of non-native ticks have been found in Alaska⁵⁷, and climate change may make it more likely that they will establish and find a new home in the state.

One of the most evident impacts of climate change in Anchorage is our changing winter weather. As our winter temperatures continue to warm, we expect that more of our winter days will hover around freezing. This means that when we get snow in Anchorage, it is more likely to be followed by a rain event, quickly turning the ground to ice. Icy roads and sidewalks are a safety concern. Additionally, icy trails mean that opportunities for Anchorage residents to get outside for recreation in the winter are more limited. Having outlets for outdoor activities during the long, dark winter months are important for both the physical and mental health of Anchorage residents.

⁵⁶ <http://forestry.alaska.gov/Assets/pdfs/firestats/2017%20Fire%20Statistics.pdf>

⁵⁷ <https://academic.oup.com/jme/article/53/6/1391/2658170>

Climate change and emergency preparedness

In Anchorage, it is important that we respond to the ongoing health and safety concerns that we are already experiencing, as well as emerging threats that are new to Anchorage and may not have been recognized or significant problems in the past. Examples include winter floods, spring wind storms, summer heat waves, and fall fire events. We also need to plan ahead and provide support to households and neighborhoods so that they can become more *climate-resilient*. This can be through education about how climate change affects health and safety so that residents have the information they need to prepare their households for changing weather patterns. It can also include outreach about Municipal programs to support household and neighborhood emergency preparedness planning. At the community level, it is also critical that we increase the capacity of our emergency operations team and community partners to effectively communicate and respond in the case of emergencies.

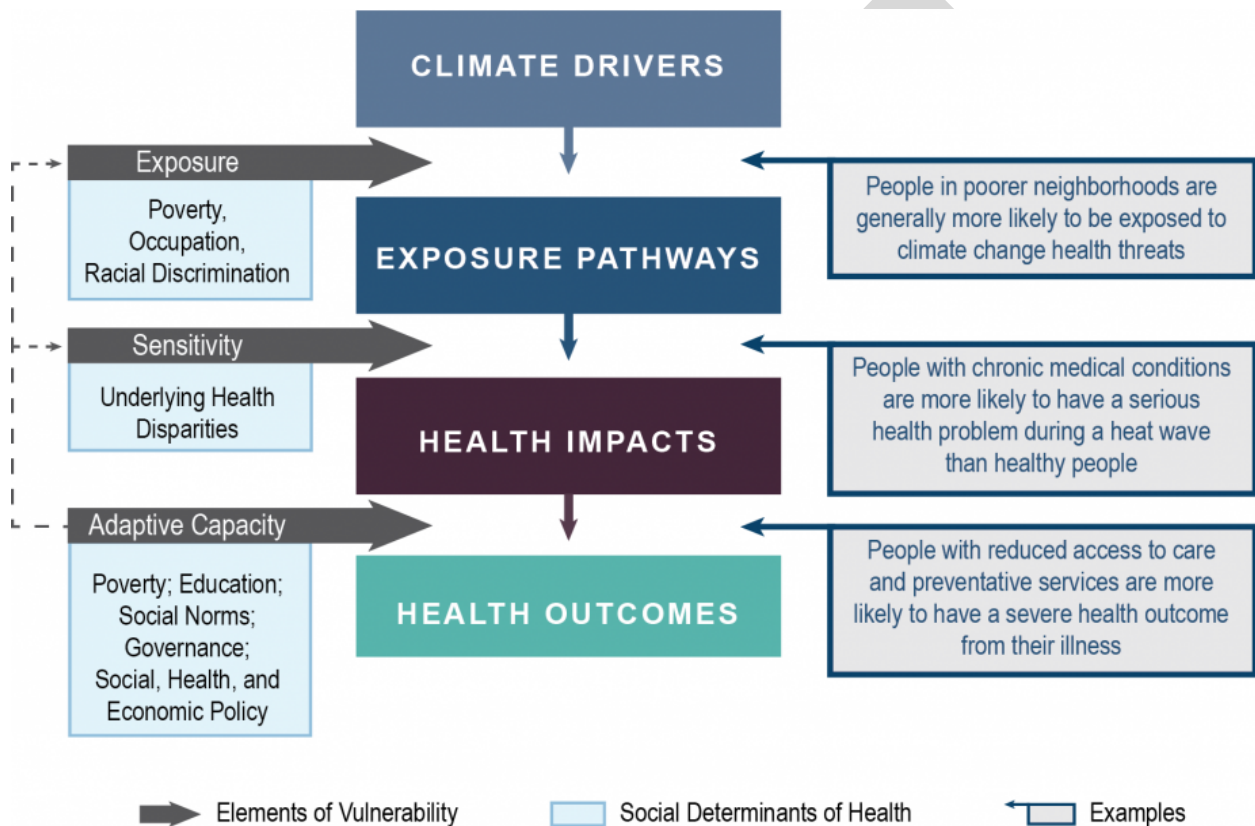
Resilient communities are prepared for a variety of disasters. They are able to adapt to and recover from natural hazards, shocks, and stresses while maintaining daily functions and progressing towards long term goals. This is particularly important to consider given Anchorage's deep dependence on the frequent shipments of critical supplies – including medicine and food – from the continental U.S. Improving resiliency to the effects of climate change includes securing back up supplies that scales from the household level to community level. Also, resilience planning includes support for increasing neighborhood engagement in educating and planning for climate-related hazards.

The role of research and monitoring

Research and monitoring are critical components of effectively addressing the health and safety impacts of climate change in Anchorage. The development of key health indicators of climate change in Anchorage will be an important first step for establishing a baseline by which we can monitor change. Establishing surveillance and monitoring systems that have predefined thresholds for action will help Anchorage medical and public health professionals respond to emerging health impacts of climate change. Such systems could include air quality monitoring stations that collect data to calculate smoke exposure from wildfires or pollen levels, integrated hospital and clinic-based surveillance systems that monitor injury admissions, or ecological monitoring to aid in early identification of non-native vectors such as ticks and mosquitoes.

Understanding vulnerability to climate change impacts

Many climate-related health impacts will affect residents across Anchorage differently, depending on factors such as demographics, socio-economic status, pre-existing health conditions, and geography. For example, in June 2015, Anchorage residents received smoke alerts from multiple fires from Interior Alaska to the Kenai Peninsula. Smoke from wildfires can cause an increase in respiratory illness. People who have diagnosed asthma, are pregnant, or have a job that requires that they work outside are particularly vulnerable to wildfire smoke. For an adaptation action (such as an educational campaign about the importance of air filtration systems during a wildfire smoke event) to be effective, it must consider each of the potential factors that could make some people, neighborhoods, and/or populations particularly vulnerable, especially in a city as diverse as Anchorage.



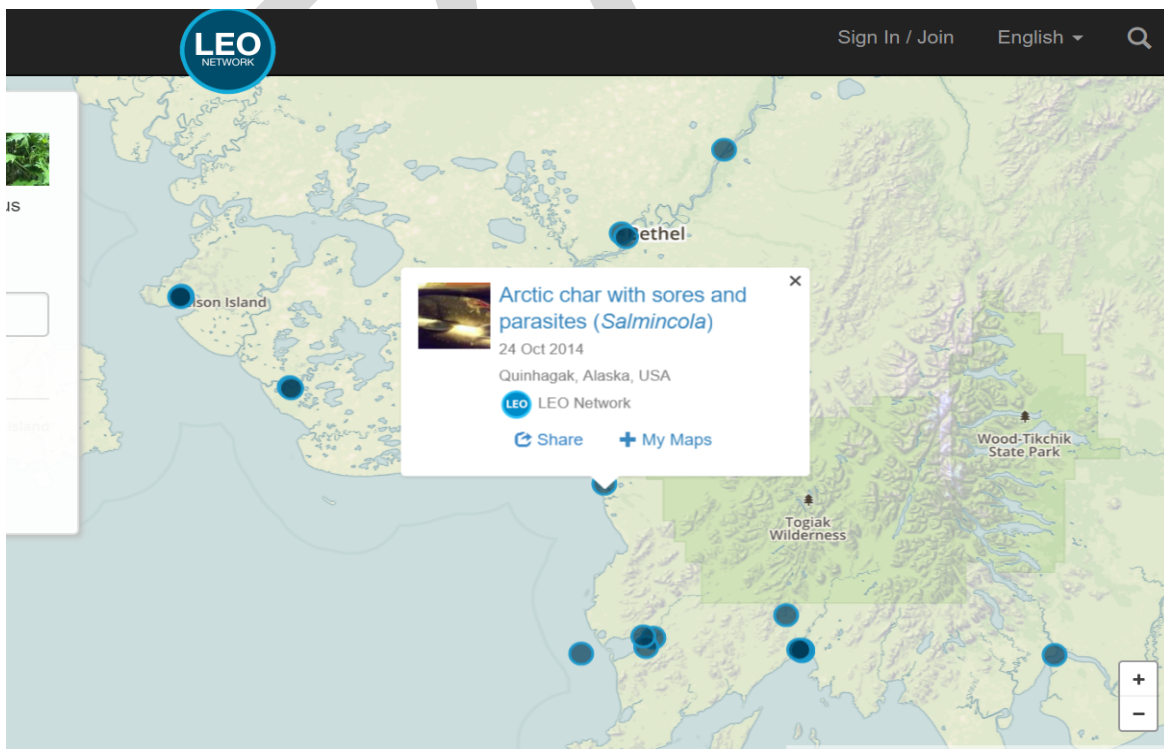
Case Study: Local Environmental Observer (LEO) Network

Arctic communities were among the first to experience impacts from climate change. In 2009, the Alaska Native Tribal Health Consortium (ANTHC) established the Center for Climate and Health to work with local residents and experts to describe connections between environmental impacts, climate change, and health. ANTHC launched the LEO Network in 2012 for local observers and topic experts to share knowledge about unusual environment, weather, and animal events. With LEO, community members can connect to share observations, raise awareness, and find answers about environmental events. The LEO Network provides a platform to engage with experts from different organizations and become part of an observer community. ANTHC hosts a monthly webinar and teleconference for participants in Alaska to review and discuss recent environmental observations.

The LEO Network was created to be the eyes, ears, and voice of our changing environment. Here is an example observation:

A resident in Shishmaref in late December 2016 reported on the LEO Network that “The Bering Straits sea ice along the shores of Shishmaref was finally freezing up, but, due to strong southerly winds, the thin ocean sea ice blew away.” A scientist from UAF responded with expert information: “At Shishmaref, during the past 20 years first ice has appeared on average during the third week of November, based on satellite images, a late appearance of first ice would have occurred by the first week of December. Based on those long-term observations, this year’s delay into the last week of December is unusual. This late freeze-up is part of a very warm year in Alaska, with ocean temperatures much higher than normal and many of the weather stations on land reporting a record warm year for 2016.”

An overview of the LEO Network virtual map can be found at <http://leonetwork.org/en/map#lat=61.8428&lng=-165.5817&zoom=7>. The LEO Network Alaska map displays observations and where they occurred. The maps contain descriptions, photos, expert consultation, and links to information resources.



Health and Emergency Preparedness

2050 Vision: Anchorage is a flourishing and resilient community that embraces a culture of preparedness and adaptability at household, neighborhood, and municipal levels to equitably improve health and safety.

Objective 13. Reduce risks to health and safety created by ongoing climate impacts.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 13A | Increase household education about water quality and food storage risks resulting from power outages associated with increased extreme weather events (e.g. wind storms, ice storms, avalanches, etc.). | health | MOA Office of Emergency Management (OEM) | Municipal Light & Power, Chugach Electric Association (CEA), Matanuska Electric Association (MEA), Anchorage Health Department (AHD) | Near-term |
| 13B | Support education to the public and medical and veterinary community on the potential for importation of non-native insect vectors (e.g. ticks, mosquitoes, fleas) through human and pet travel to areas outside of Alaska where these insect vectors are prevalent. | environment, health | Anchorage Health Department (AHD) | UAA, Alaska Department of Health and Social Services (AK DHSS) Office of the State Veterinarian, Alaska Dept of Fish and Game (ADF&G) | Near-term |
| 13C | Review the current recreational burn guidelines and criteria for "approved burn days" to assess whether additional climate tools or information would be helpful for refining these criteria. | environment, health | Anchorage Fire Department (AFD) | Alaska Department of Natural Resources (AK DNR) Division of Forestry, National Weather Service (NWS) | Near-term |
| 13D | Expand visibility of the Anchorage Air Quality Index including particulate matter and pollen counts so that the public is aware of bad air quality days. Include strategies for coping with poor air quality days. | health, equity | AHD | Alaska Department of Environmental Conservation (AK DEC) Division of Air Quality and Public Information Officer, AK DHSS Section of Epidemiology and Public Information Officer, NWS, news outlets | Near-term |
| 13E | Educate the public about the health risks of higher temperatures, develop strategies to check on individuals at greatest risk, and make options for cooling widely accessible. | health, equity | AHD | Catholic Social Services (CSS), Federation of Community Councils (FCC), Older Persons Action Group, community centers, local hospitals | Mid-term |
| 13F | Provide culturally-appropriate resources for health professionals about the potential mental health impacts of climate change including seasonal affective disorder (SAD) and grief counseling for those who have lost their communities or relocated. Develop projections / plans for addressing future mental health needs in the Municipality. | health | AHD | Anchorage Community Mental Health Services, Inc., University of Alaska Anchorage (UAA), Alaska Pacific University (APU), Alaska Native Tribal Health Consortium (ANTHC), local hospitals, faith-based organizations | Mid-term |

Objective 14. Identify, coordinate, and engage diverse groups of people to ensure that health and safety resources to respond to climate change impacts are inclusive and accessible to all Anchorage residents.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 14A | Increase outreach to diverse populations about climate change and health, natural hazards, and emergency preparedness by via broadcast, print, bus ads, social media, and other forms of communication in multiple languages to ensure that emergency preparedness planning reaches all Anchorage residents. | health, equity | Muni-wide | FCC, American Red Cross of Alaska, Alaska Disabilities Advisory Group, Anchorage cultural organizations | Near-term and Ongoing |
| 14B | Support and expand a social vulnerability assessment to more effectively respond to diverse neighborhoods and households that are most at risk during emergency situations. Enhance interagency data sharing to increase response capacity across the city. | health, equity | OEM | AHD, Planning Department, MOA Geographic Data and Information Center (GDIC), UAA, Alaska Department of Commerce, Community, and Economic Development (AK DCCED) Division of Community and Regional Affairs, CSS | Mid-term and Ongoing |
| 14C | Work with Get Outdoors Anchorage to develop tools and communication strategies to develop a culture of flexible and diverse outdoor recreation accessible to all Anchorage residents. Enable opportunities to increase the visibility of the program. | health, equity | Parks and Recreation (P&R) | Get Outdoors Anchorage Coalition; AK DHSS (Chronic Disease Prevention & Health Promotion, esp. Play Every Day); ASD; Anchorage Park Foundation; local outdoor groups (e.g. Nordic Skiing Association of Anchorage, APU, UAA); JBER; NWS; CSS Refugee Assistance and Immigration Services; Alaska Literacy Program | Mid-term |

Objective 15. Build household resilience, self-sufficiency, and capacity to prepare for and respond to the health and safety impacts of climate change.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------|-----------|
| 15A | Develop an Anchorage-based program to support families who cannot afford to purchase supplies for household emergency preparedness kits to adequately prepare their homes (e.g. solicit emergency supply donations). Engage with community partners and businesses to determine the most effective strategy. Identify possible strategies through a review of donation programs in other communities. | health, equity | OEM | Anchorage Local Emergency Planning Committee, AFD, American Red Cross of Alaska, Salvation Army Alaska Division | Mid-term |
| 15B | Develop capacity for household wildfire mitigation by supporting a full-time Forester position in the Fire | environment, health | AFD | AK DNR Division of Parks and Outdoor Recreation and Division of Forestry, FCC | Uncertain |

| | | | | | |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----|---------------------------------------------------------------------------------------------------------------------------|----------|
| | Department and reinstating the Firewise Program. This position and program will support community outreach and education to help homeowners understand the recommendations in the Firewise Manual and provide household inspections. They will also support the Urban Forester proposed in Urban Forests and Watersheds (Action 21A). | | | | |
| 15C | Create opportunities for safe food preservation and storage education for Anchorage households. Support the development of community kitchen facilities for household food preservation use and shared cold storage such as a community meat lockers (supports Food Systems Action 19G). | health, equity | AHD | UAF Cooperative Extension, Food Bank of Alaska, Alaska Department of Environmental Conservation (AK DEC), UAA, ANTHC, CSS | Mid-term |

Objective 16. Build community resilience, self-sufficiency, and capacity to prepare for and respond to the health and safety impacts of climate change.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 16A | Give Community Councils tools (e.g. webinar trainings on emergency preparedness, facilitation guides, and other materials in multiple languages) to have dialogues about emergency preparedness within neighborhoods and to create local resilience strategies such as an Adopt-A-Neighbor campaign or hosting an OEM CERT-like training session in their community. | health, equity | OEM | FCC, Alaska Department of Military and Veterans Affairs Division of Homeland Security and Emergency Management (AK DHSEM), UAA, APU Outdoor Studies Wilderness First Responder Program | Near-term |
| 16B | Improve the local Emergency Alert System (EAS) capability by incorporating the Integrated Public Warning And Alert System (IPAWS). | health | OEM | American Red Cross of Alaska, Federal Emergency Management Agency (FEMA) | Mid-term |
| 16C | Improve local Mass Care response capabilities for sheltering by increasing stocks of prepositioned sheltering supplies and equipment. The increased stocks should include both durable equipment and consumable supplies. Also included should be mobility aids and equipment for people with functional access needs, pet sheltering supplies, and generic congregate care supplies identified by the American Red Cross. | health, equity | OEM | American Red Cross of Alaska | Mid-term |
| 16D | Develop an emergency food plan that includes an assessment of the need for food (how much food is available in the Municipality and how much will be needed to protect the population from food shortages), plan for | health, equity | OEM | AHD, AK DHSEM, AK DNR, AK Division of Agriculture, UAF Cooperative Extension, Alaska Food Policy Council, UAA, APU | Mid-term |

| | | | | | |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------------------------------------------------|------------------------------------|----------|
| | stockpiling the necessary food supplies, and a distribution and public communication plan that takes into account those most at risk for food insecurity. Work with local retailers, producers, and warehouses to obtain and store the necessary food stocks. | | | | |
| 16E | Engage the business community in developing emergency response plans and business continuity plans. | health | Office of Economic and Community Development (OECD) | Anchorage Chamber of Commerce, UAA | Mid-term |

Objective 17. Conduct monitoring and research to support our understanding of and planning for the health and safety impacts of climate change.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------|
| 17A | Develop a framework for selecting, monitoring, and integrating indicators of health and safety impacts of climate change within clinical contexts, including hospital and clinic admissions related to respiratory, cardiovascular, injuries, and other health outcomes that could be linked to climate change in Anchorage. Include demographic information. | health | AHD | AFD, AK DHSS, ANTHC, Alaska Native Medical Center, regional hospitals | Near-term |
| 17B | Support surveillance efforts for the early detection of non-native vectors (e.g. ticks, mosquitoes, fleas) that may impact human or wildlife health (See Urban Forests and Watersheds Actions 23A and 23B). | environment, health | AHD | AK DHSS Office of the State Veterinarian, AK DF&G, UAA, ANTHC Local Environmental Observer (LEO) Network | Near-term |
| 17C | Work with AK DEC to ensure that data collection protocols for particulate matter monitoring are sufficient to estimate the health impact of smoke exposure during wildfire events. | environment, health, equity | AHD | AFD, UAA, AK DEC | Near-term |
| 17D | Continue assessments of future water requirements to meet the demands of the population in the Municipality of Anchorage that incorporate regional population growth trends, climate data and historical seasonal water usage patterns (See Urban Forests and Watersheds Action 22E). | environment, health, equity | Anchorage Water & Wastewater Utility (AWWU) | MOA Watershed Management, AHD, UAA | Near-term |
| 17E | Conduct a literature review of other communities that have adopted Climate Action Plans with effective emergency preparedness measures to help identify best practices suitable for inclusion in future Anchorage climate adaptation planning documents. | health | OEM | UAA, APU | Near-term |



FOOD SYSTEMS

Food Systems

A food system includes the entire food chain from production, distribution, storage and processing, access, to waste. In addition to the impacts of climate change, Alaska's food system has unique challenges and opportunities due to geography, infrastructure, scale of agriculture and processing, population density, and reliance on imported food and products. As a result of these factors, food prices are higher in Alaska and Anchorage compared to many other places in the Lower 48. High food costs reduce food security - a basic human right.⁵⁸

Historically, Alaska Native people and early homesteaders survived on a diet consisting of a variety of local foods, and incorporating Alaska Native values and traditional food practices is still a large part of the food culture in Alaska. In the early 1900's, the Matanuska-Susitna Valley had 33 dairy farms. Though many Alaskans continue subsistence and recreational harvests of game, much remains to be done to achieve greater self-reliance on the local food system. Today, Alaskans, particularly those living in urban Alaska, consume a lot of imported foods - "95% of the \$2 billion of food Alaskans purchase is imported".⁵⁹

Food security in Anchorage, and indeed across Alaska, is vulnerable to shifts in climate through changes to the movement and habitat of important subsistence animals and an increase in crop diseases and pests. Additionally, more extreme weather events could delay shipments of food from outside of Alaska. Climate change is also impacting local food production in the Anchorage area. An earlier spring warm up has lengthened the growing season and created new opportunities to explore fruit and vegetable species that require a longer time to grow.



Anchorage Parks and Recreation currently operates four community gardens. The Master Plan for Chanshtnu Muldoon Park includes space for 54 new garden plots, funded through an Anchorage Park Foundation challenge grant. Additional garden plots were added at the Fairview Lions Park community garden in 2018- 12 new 10'x20' plots.⁶⁰

⁵⁸ <https://nca2014.globalchange.gov/report/sectors/indigenous-peoples#statement-16411>

⁵⁹ Meter, Ken, Megan Phillips Goldenberg. (2014) Building Food Security in Alaska. Available at <http://www.crcworks.org/akfood.pdf>

⁶⁰ <https://www.muni.org/Departments/parks/Pages/MuldoonCommunityParkMasterPlan.aspx>

Incorporating the values of resilience and self-reliance into the entire food system and decreasing reliance on imported food will increase food security and promote equity in Anchorage. Indigenous ways of knowing and practices of inclusivity and community involvement should be integrated into management, research, and policy decisions throughout the food system. By integrating diverse stakeholders in food systems discussion, the Municipality of Anchorage will be able to create solutions that decrease the Municipality's food-related greenhouse gas emissions while improving food security, disaster preparedness, and equitable access to healthy food options for all Anchorage residents.

Potential solutions to decrease food-related greenhouse gas emissions and adapt to climate change impacts on the food system in Anchorage are diverse. Options include preserving agricultural land for production, raising awareness of the Alaska Grown program, developing facilities to process local food products, educating on traditional foods, and decreasing food waste.⁶¹

Case Study: Local Food Mini-Grant Program supports community projects that increase access to local food.

In 2018, Mayor Berkowitz's office launched the Local Food Mini-Grant Program in partnership with the Alaska Food Policy Council. The program was funded by national nonprofit Cities of Service and the Alaska Department of Health and Social Services, and had a simple goal: to empower Anchorage residents to improve food security and build community resilience in their neighborhoods. The only criterion was that projects had to increase access to locally grown food and demonstrate community involvement. A total of 17 community projects, ranging from school vegetable gardens to edible landscaping, were awarded mini-grants of \$500-\$1000.



Case Study: Government Hill Commons

Land cleared for the Knik Arm Bridge in the neighborhood of Government Hill has been redeveloped as a "Commons" garden by a nonprofit and neighborhood volunteers. The Commons includes flowering apple, pear, and cherry trees, raised beds of highbush blueberries, raspberries, and other fruits, and space to host picnics and films.⁶²

(Photo credit: Stephanie Kesler)

⁶¹ <https://anthc.org/what-we-do/traditional-foods-and-nutrition/>

⁶² <https://www.adn.com/slideshow/alaska-news/anchorage/2017/09/09/photos-government-hill-orchard-begins-to-take-shape/>

Food Systems

2050 Vision: Anchorage will have an ecologically, socially, and economically resilient food system, where culturally-relevant and sustainably produced and sourced foods are available to everyone.

Objective 18. Support the Alaska Grown market and enable regional food system solutions to decrease fossil fuel use.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 18A | Conduct a regional food system assessment to understand Southcentral Alaska's food and agriculture assets and supply chain bottlenecks. Identify potential markets for Alaska Grown foods. | | Office of Economic and Community Development (OECD) | University of Alaska Anchorage (UAA), Alaska Pacific University (APU), Alaska Department of Natural Resources (AK DNR) Division of Agriculture, Alaska Native Corporations, Alaska Department of Fish & Game (ADF&G), US Department of Agriculture (USDA), Alaska Food Policy Council (AFPC), Alaska land trusts | Mid-term |
| 18B | Conduct an assessment of the Anchorage food supply to identify where our food comes from in order to set targets for Anchorage's food sourcing. | | OECD | UAA, APU, Port of Alaska, Ted Stevens Anchorage International Airport (TSAIA), Alaska Department of Military and Veterans Affairs Division of Homeland Security and Emergency Management (AK DHSEM), transportation industry, retailers, Mat-Su Valley producers | Mid-term |
| 18C | Analyze existing MOA purchasing and procurement policies and explore creating a preference for purchasing locally grown (i.e. Alaska Grown) foods. | Jobs and prosperity | Purchasing Department | Anchorage School District (ASD), Arctic Harvest Deliveries | Near-term |
| 18D | Promote and expand public education campaigns to encourage purchasing locally grown (i.e. Alaska Grown) food at the individual and institutional level. | | Office of the Mayor | AK DNR Division of Agriculture, Alaska Farmers Market Association, Alaska Seafood Marketing Institute, Alaska Marine Conservation Council, Rising Tide Communications, local media | Near-term |
| 18E | Develop more comprehensive outreach and support for individuals and entrepreneurs interested in developing new Alaska Grown and created food products. | jobs and prosperity | OECD | Anchorage Economic Development Corporation (AEDC), the Food Corridor, Charlie's Produce, ASD, Anchorage Community Land Trust (ACLT), Spork Consulting | Mid-term |

Objective 19. Support equitable access and consumption of low-carbon and local foods.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------|
| 19A | Identify funding mechanisms for an MOA position to coordinate and facilitate food system solutions including adaptation and mitigation of climate change impacts. Tasks include education and training for residents and businesses, building relationships between food buyers and food businesses, and coordinating other actions in this section on Food Systems. | health, equity, jobs and prosperity | Office of the Mayor | AK DNR Division of Agriculture, USDA, AEDC, AFPC, UAA, APU, private industry, and other food organizations | Uncertain |
| 19B | Expand Local Food Mini-Grant Program to support community projects that increase access to local food. | health, equity | Office of the Mayor | AK DHSS, AFPC, UAA, APU, ACLT, FCC, nonprofits | Near-term |
| 19C | Encourage and incentivize farmers markets to accept payment through food assistance programs, including SNAP, WIC, WIC FMNP, and Seniors FMNP. | health, equity, jobs and prosperity | AHD (Anchorage Health Department) | Alaska Farmers Market Association | Near-term |
| 19D | Continue to develop edible landscaping in the MOA Horticulture program and tie current and future edible landscape initiatives together to educate residents about these local food resources and to showcase the variety of plants that can grow in Anchorage | health, equity | Parks and Recreation (P&R) | UAF Cooperative Extension, Food Bank of Alaska, AFPC, Alaska Master Gardeners | Near-term |
| 19E | Support existing school and community gardens and provide opportunities to expand community growing spaces with a focus on youth and low-income residents. | health, equity | P&R | Anchorage School Garden Network, UAA, APU, Alaska Master Gardeners, UAF Cooperative Extension, Alaska Botanical Garden | Near-term |
| 19F | Support produce prescription programs in partnership with hospitals, clinics, and local food assistance providers. | health, equity | AHD | Hospitals, clinics, other health care providers, grocery stores, farmers markets, Food Bank of Alaska, health insurance companies | Mid-term |
| 19G | Develop education strategies for teaching Anchorage residents about growing, harvesting, cooking, and processing local agricultural goods and subsistence resources in neighborhoods most at risk of food insecurity (supports Health and Emergency Preparedness Action 15C) | health, equity | P&R | UAF Cooperative Extension, Food Bank of Alaska, Alaska Master Gardeners | Mid-term |
| 19H | Support efforts to identify and increase utilization of shared food system assets such as shared food storage space, community commercial kitchens, and group purchasing of growing equipment such as backyard greenhouses or hoop houses. | health, equity | OECD | AK Department of Environmental Conservation (AK DEC), the Food Corridor, AEDC, ASD, ACLT, Charlie's Produce | Mid-term |

| 19I | Develop a framework for assessing what it means to have a "low carbon diet" in the context of an Alaskan diet that includes wild fish and game. | | Office of the Mayor | UAA, APU, AHD | Mid-term |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------|------------------------------------------------------------------------|-------------|
| Objective 20. Reduce and repurpose food waste. | | | | | |
| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
| 20A | Increase composting through expanding the curbside composting pilot program, community composting, and education programs on the importance of reducing waste and benefits of composting and how to compost and how to use compost (See Consumption and Solid Waste Action 10D). | environment | Solid Waste Services (SWS) | Compost end users (i.e. agriculture sector, landscapers) | In progress |
| 20B | Conduct an organics waste collection pilot project with a sample of Anchorage businesses to test the interest, methodology, and amount of commercial food waste that would need to be accommodated by a commercial organics collection program. Explore possible incentives for food retailers and restaurants to participate in food waste reuse and recycling programs. | environment | SWS | ASD, JBER, TSAIA, hospitals, universities, food retailers, restaurants | Mid-term |
| 20C | Revise the Anchorage Food Code to allow people to use personal containers for prepared food take-out. | | Anchorage Health Department | Alaska Cabaret, Hotel, Restaurant, and Retailers Association (CHARR) | Mid-term |



URBAN FOREST AND WATERSHEDS

Urban Forest and Watersheds

Forests and watersheds provide benefits to residents and visitors of Anchorage, as well as important habitat for Alaska's fish and wildlife. Anchorage is comprised of multiple diverse watersheds that span the land-use gradient from urban to natural. This shared habitat supports a vibrant community that is proud to co-exist with abundant wildlife and fish.

Eklutna Lake and its watershed provides drinking water and hydroelectric power for Anchorage. Anchorage watersheds support year-round recreation including: running, walking, biking, cross country skiing, wildlife viewing, and fishing. Many of Anchorage's 250 miles of trails run through these watersheds, connecting neighborhoods, parks, and open spaces. Several Anchorage watersheds support urban salmon runs, a unique feature that benefits residents and attracts visitors.

Trees in yards, parks, and shared right of ways make up the urban forest. These trees provide clean air, shade, protection from the elements, habitat, food, and peace of mind. In addition to these tangible benefits, recent studies have demonstrated a link between human health and the presence of trees. For example, the invasive Emerald Ash Borer beetle killed 100 million trees in 15 US states, as a result there were increased deaths of residents due to an increase in cardiovascular and respiratory illnesses.⁶³ Urban forests and contact with nature also have documented benefits to human social connections and mental health and well-being.

Anchorage's forestlands, waterways, wetlands, and soils are some of the most important tools for mitigating the impacts of climate change. These natural assets, along with increased implementation of green infrastructure and low impact development practices, sequester carbon, improve air quality, provide clean water, and regulate temperatures. Based on field data from ten US cities, urban forests currently store 700 million tons of carbon.⁶⁴



Bioswales and rain gardens included in building and infrastructure designed to catch runoff from rainfall. Bioswales and rain gardens can be used along sidewalks, roofs, and other hard surfaces to capture rainwater and filter out contaminants from runoff that can end up in our waterways. The Municipality of Anchorage currently supports a rain garden program, including free literature, advice, and site visits to residents interested in a Low Impact Development (LID) or rain garden project.^{65,66}

⁶³ Donovan, G. H., Butry, D. T., Michael, Y. L., Prestemon, J. P., Liebhold, A. M., Gatzliolis, D., & Mao, M. Y. (2013). The relationship between trees and human health: Evidence from the spread of the emerald ash borer. *American Journal of Preventive Medicine*, 44(2), 139.

⁶⁴ Nowak DJ, Crane DE. 2002. Carbon storage and sequestration by urban trees in the USA. *Environmental Pollution*. 116: 381-389.

⁶⁵ <https://alaskamastergardener.community.uaf.edu/2015/08/04/rain-garden-resources-for-alaskans/>

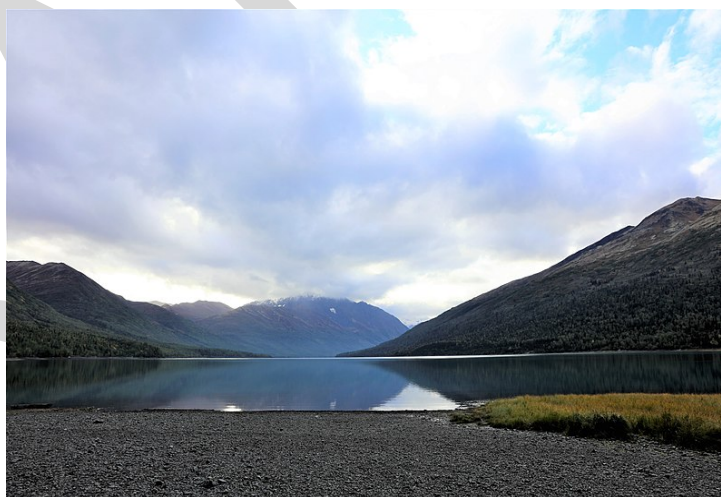
⁶⁶ <https://www.muni.org/Departments/SWS/recycle/Documents/5.1%20Water%20Quality%20and%20Rain%20Gardens.pdf>

Climate impacts on urban forests and watersheds

Many changes to the urban forests and watersheds have already been observed in Anchorage. These changes often have ripple effects throughout the ecosystem with consequences for many species. For example, an overall increase in air temperature can raise stream temperatures and increase evapotranspiration, which impacts habitat suitability for fish and aquatic plants. Similarly, changes in the timing and volume of runoff during spring as a result of melting snowpack can affect nutrient cycling and habitat quality for aquatic species. As the treeline in Anchorage moves up in elevation, it will begin to replace alpine tundra. As this happens, less light is reflected from snow cover and more heat is absorbed, creating a feedback that facilitates rapid snowmelt and exacerbates issues associated with changing runoff.^{67,68} Higher temperatures can also contribute to increased wildfire risk and can exacerbate epidemic occurrences of forest pests and pathogens.

Major hydrologic changes have already been observed in Anchorage and are expected to continue causing degradation of salmon habitat, potential reductions in wildlife abundance, and loss of winter snow sport opportunities.⁶⁹ Monitoring and predicting hydrologic changes and the run-off rate for Eklutna Lake and its watershed are especially important, as they provide over 85% of the water for Anchorage's residential and commercial use, manufacturing, industrial cooling, and hydropower uses. Mid-winter freeze-thaw events require more sand, gravel, and salt to keep roads safe for Anchorage residents. This leads to increased sedimentation and turbidity in our water sources and degraded aquatic habitat, more frequent and severe flood events, and more stormwater infrastructure maintenance.

Eklutna Lake. Over 85% of the 8.3 trillion gallons of water supplied for Anchorage Water & Wastewater Utility (AWWU) comes from Eklutna Lake, but the life expectancy for the glacier providing this water is estimated to come to an end within the next 100 years. The Eklutna Glacier has seen an increase of the loss of glacial mass over the years with an average of 7% annually between 2010 and 2015 and an even higher average of 13% in the hotter years of 2013 and 2015.⁷⁰ (Photo available under creative commons licensing, credit: Enrico Blasutto)



Finally, invasive species have the potential to disrupt ecosystem processes, compete with and displace native species, and destroy habitat for wildlife and fish. Changes in climate may make forests and waterways more hospitable to invasive species. Elodea (*Elodea spp.*), which degrades freshwater habitat, has recently been detected in Anchorage lakes.⁷¹ Invasive trees such as European Bird

⁶⁷ Foley JA, Kutzback JE, Coe MT, Levis S.1994. Feedbacks between climate and boreal forests during the Holocene epoch. *Nature* 271:52–54.

⁶⁸ Chapin III FS, McGuire AD, Randerson JT, Pielke R, Baldocchi, DD, Hobbie SE, Roulet N, Eugster W, Kasischke ES, Rastetter EB, Zimov SA, Running S.2000. Arctic and boreal ecosystems of western North America as components of the climate system. *Global Change Biology* 6 (suppl.):211–223.

⁶⁹ Hayward, G. D., Colt, S., McTeague, M. L., Hollingsworth, T. N., & Pacific Northwest Research Station (Portland, Or.). (2017). Climate change vulnerability assessment for the chugach national forest and the Kenai Peninsula. (No. 950.;GTR-950;). Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

⁷⁰ <https://www.awwu.biz/water-quality/water-quality-and-the-customer/current-usgs-eklutna-lake-level>

⁷¹ Alaska Department of Natural Resources. 2018. Invasive plants and agricultural pest management. Alaska Department of Natural Resources, Division of Agriculture. <http://plants.alaska.gov/invasives/elodea.htm> Accessed on October 20, 2018.

Cherry (*Prunus padus*) can displace native species, alter forest succession and composition, and create visual barriers causing safety concerns in parks and along trails.

Protecting our greenspaces and watersheds

Overall, 35% of the Anchorage Bowl is covered with tree canopy.⁷² Several large tracts of forest, including Chugach State Park, Chugach National Forest, and the many city parks and greenspaces make up a significant portion of this canopy. In these areas, tree canopy coverage is closer to 75%, so protection and preservation of these forests is critical for many reasons.

As Anchorage's population continues to grow and development expands, forests and watersheds will see increased pressure and stress that is compounded by climate change. It is imperative that policies are established to stop further canopy loss, protect greenspace and watersheds, and incorporate more green infrastructure into future development in a strategic and equitable way. Forests and watersheds within the Anchorage area have already been influenced by climate change and will continue to be affected in the future. An adequately funded and supported urban forestry program is vital for preserving and managing forests and green spaces. Healthy urban forests and watersheds are important for maintaining ecosystem functions and providing habitat for wildlife, fish, and birds. These elements provide for our community's well-being and connection to the environment.

Case Study: UAA is a Tree Campus USA

UAA is Tree Campus USA for the ninth consecutive year, recognized for its conservation capabilities in promoting and enhancing our urban forests. The five core requirements to become a Tree Campus USA include: (1) having an established tree advisory committee, (2) a campus tree care plan, (3) campus commitment to annual spending on tree programs, (4) recognition of Arbor Day, and (5) promotion of student participation in service-learning projects.

Encouraging a bounty of trees on UAA's campus not only improves air quality and protection from the elements but is also benefiting the overall quality of life for students and faculty. Green spaces on campus give students more room to de-stress and take a mental break. Additionally, a well-designed tree campus can have energy efficiency benefits by cutting heating and cooling costs.

UAA aims to preserve large areas of mature vegetation and trees during construction projects in order to preserve and rehabilitate animal habitat. UAA's landscaping team successfully restored habitat around Chester Creek behind student housing. They revegetated 1,450 feet of stream bank by planting 1,000 cottonwood, alder, and willow trees to improve areas that had been damaged by erosion. After revegetation, fish and beavers began to occupy the stream. Beavers no longer live in the area, most likely due to increase in human activity, but the process demonstrated how landscape management is a valuable asset for urban forest sustainability.

⁷² http://forestry.alaska.gov/Assets/pdfs/community/organizations/AnchorageFAMP-final_draft.pdf

Urban Forests and Watersheds

2050 Vision: Anchorage strives for forests and watersheds that provide all residents and visitors with access to a resilient ecosystem that yields recreational opportunities, clean air and water, peace of mind, and habitat for fish and wildlife.

Objective 21. Maintain or improve resilience of urban forest and watersheds in Anchorage to promote ecosystem services and buffer against extreme weather events.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 21A | Sustain a full time, year-round urban forester through the Anchorage Fire Department (AFD) to 1) update the Community Wildfire Protection Plan, 2) implement the plan with active forest management, and 3) facilitate communication and collaboration among agencies, including Parks and Recreation. | environment, health, equity | AFD | Parks and Recreation (P&R), Planning Department, Alaska Department of Natural Resources (AK DNR) Division of Forestry and Community Forestry Program, UAF Cooperative Extension | Mid-term |
| 21B | Develop an urban forest management plan to establish objectives and best management practices for MOA's urban forest and to identify appropriate canopy cover and diversity goals for Anchorage. | environment, health | P&R, AFD | Planning Department, AK DNR Division of Forestry and Community Forestry Program, UAF Cooperative Extension | Mid-term |
| 21C | Preserve existing forested areas through practices that re-purpose already developed areas, such as establishing codes that retain minimum canopy cover on new development (See Land Use and Transportation Action 5D). | environment, health, equity | Planning Department, P&R | Anchorage Assembly, AFD, Project Management & Engineering (PM&E), AK DNR Division of Forestry and Community Forestry Program, AK Department of Fish and Game (AK DF&G), Joint Base Elmendorf-Richardson (JBER) | Uncertain |
| 21D | Support efforts to protect and restore extended riparian corridors to maintain wildlife and fish habitat, including efforts to reestablish historical surface channels and connectivity. | environment, health | PM&E (Watershed Management) | P&R, Planning Department, AK DF&G, Anchorage Waterways Council, JBER, U.S. Forest Service, U.S. Fish and Wildlife Service (USFWS) | Long-term |
| 21E | Increase GIS capacity in the MOA Planning Department in order to analyze environmental data in relation to long range and current planning issues that may be impacted by climate change. | | Planning Department | UAA Center for Conservation Science, AK DF&G, AK DNR Division of Forestry | Uncertain |
| 21F | Promote and expand weed pulls, tree plantings, spruce beetle identification and management, wildfire mitigation, scoop poop events, and other educational activities that promote stewardship among the public, businesses, and homeowners. | environment, equity | P&R | AK DNR, UAA, APU, ASD | Near-term |

Objective 22. Reduce run-off to mitigate peak flows and flooding and promote better water quality.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-----------|
| 22A | Protect and facilitate expansion of wetlands, monitor water quality, and preserve the ecosystem function of wetlands and creeks through strengthening current municipal zoning regulations and codes and exploring incentives for developers. | environment, equity, health | Planning Department, Real Estate Department | PM&E, Heritage Land Bank (HLB), Alaska Department of Environmental Conservation (AK DEC), Great Land Trust | Long-term |
| 22B | Incentivize and prioritize the development of "green infrastructure" such as parks, wetlands, riparian and wildlife corridors, and natural drainageways, and low-impact development. Research green infrastructure implementation and long-term viability in a sub-Arctic environment. | environment, equity, Jobs and prosperity | PM&E (Watershed Management), Maintenance and Operations (M&O) | UAA Small Business Development Center, Planning Department | Mid-term |
| 22C | Strengthen municipal requirements for stormwater retention (keeping all of the water) and detention (retain amount for a certain amount of time) for new development. | environment, health, Jobs and prosperity | PM&E (Watershed Management), Development Services | AK DEC | Mid-term |
| 22D | Expand public education about the value of watersheds, storm water run-off, and rain gardens. | environment, equity, health | PM&E (Watershed Management), Development Services | P&R, UAA, ASD, Anchorage Park Foundation, Campbell Creek Science Center, FCC | Near-term |
| 22E | Continue to support Alaska Pacific University (APU) efforts to monitor Eklutna Watershed (e.g. glacial volume change over time, inflow of water to lake, recharge) and help make data available to the Anchorage Water and Wastewater Utility (AWWU) and ML&P (See Health and Emergency Preparedness Action 17D). | | AWWU | APU, United States Geological Survey (USGS), Eklutna, Inc., AK DEC, ADF&G, USFWS | Uncertain |
| 22F | Continue to monitor chemical snow and ice management treatments and update regulations as needed to respond to changing ice, freeze/thaw, and rain events in a way that supports a healthy watershed. | environment, health | PM&E, M&O (Street Maintenance) | Alaska Department of Transportation & Public Facilities (AK DOT&PF) | Mid-term |

Objective 23. Reduce establishment and spread of invasive species (plants, insects, aquatics, wildlife) to make our urban forest more resilient to environmental change.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------|-------------------------------------|-----------|
| 23A | Develop a watch list of potential invasive species that could establish residency in Anchorage due to climate change and distinguish this from species that might naturally expand their range into Anchorage. | | P&R | UAA Center for Conservation Science | Near-term |

| | | | | | |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------------|---------------------------------------------------------------------|-----------|
| 23B | Document and monitor spread of invasive species (See Health and Emergency Preparedness Action 17B). | environment | P&R | JBER, UAA | Long-term |
| 23C | Establish agency management practices that reduce the spread of invasive terrestrial (e.g. plants, fungus, etc.) and aquatic species (e.g. establish a source of weed free top soil or seed mix in Anchorage). | environment, Jobs and prosperity | Planning Department, P&R | AK DOT&PF | Uncertain |
| 23D | Increase the management capacity to rapidly and effectively respond to invasive species outbreaks. | environment, equity | P&R | AK DNR Plant Materials Center, AK DOT&PF, UAF Cooperative Extension | Mid-term |

Objective 24. Increase interagency cooperation to improve ecosystem management.

| No. | Actions | Co-benefits | Primary Municipal Liaison | Potential Partners | Timeline |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------------------------------------------------------|-------------------------------------------|-----------|
| 24A | Improve stormwater management by creating a stormwater utility and encourage inter-agency cooperation to increase capacity to handle climate-related events. | environment, health, equity | Office of the Mayor, PM&E (Watershed Management), AWWU | M&O Street Maintenance, AK DEC, AK DOT&PF | Mid-term |
| 24B | Share information across agencies about illegal use and waste disposal within parks and forests to reduce destruction of forests and negative impacts on water quality. | environment, health | Anchorage Health Department (AHD), P&R, Anchorage Police Department (APD) | P&R, AK DNR Community Forestry Program | Near-term |
| 24C | Enhance inter-agency communication for wildfire mitigation and emergency response. | health | Office of Emergency Management (OEM), AFD | AK DNR, AK DOT&PF, JBER, National Guard | Mid-term |

A group of people are gathered around a table in a meeting room, engaged in a discussion. A woman in the foreground is seen from the back, wearing a beige sweater. Other people are visible in the background, some looking at a table with colorful sticky notes. A white speech bubble icon is overlaid on the image. The background is softly blurred, showing office furniture and a door. The overall lighting is warm and professional.

OUTREACH AND EDUCATION

Outreach and Education

The success of the Anchorage Climate Action Plan requires partnerships between Anchorage residents, businesses, and visitors. Each sector has specific recommendations that require information for and participation from the public. Residents and visitors alike must have opportunities to learn about Anchorage's climate and resilience initiatives, understand how to find resources, engage with Municipal staff, and take actions that support the recommendations outlined in the plan. Whether someone needs access to the plan, wants to know about recycling pickup, or how they can participate in the process, an engaging and inclusive strategy for education and outreach is crucial for success.

In support of those goals, the Outreach and Education chapter outlines three important objectives: 1) utilizing effective and inclusive outreach methods to ensure that all Anchorage residents benefit throughout the implementation of all sectors of the Climate Action Plan, 2) engaging all Anchorage communities, businesses, industries, and other institutions (e.g. military) in the development and implementation of the plan, and 3) motivating our community to take individual and collective climate action.

Alaska/Anchorage Solar Tours

The 10th Annual Anchorage Solar Tour (2018) is the largest grassroots solar event in the USA. It showcases solar power use in Anchorage and around the state. Admission to the tour sites is free, and the owners of each site are present, along with some of the designers and builders, to answer questions.^{73 74}



The Municipality is committed to making the Climate Action Plan accessible and relevant to all Anchorage residents. Achieving the goals outlined in the plan will require input and action from all community groups within Anchorage. Outreach to the community about the plan and its implementation will be a multi-faceted effort and will aim to connect, address, and uplift work that is already being done within the community and by other entities across the state. A wide range of outreach strategies are necessary to accommodate residents with varying degrees of access to transportation, technological capacity, language barriers, and non-traditional work schedules.

⁷³ <http://alaskasolartour.com/2018-anchorage-solar-tour/>

⁷⁴ <http://acep.uaf.edu/acep-news/2018/14-may-acep-this-week/alaska-solar-tour-celebrates-10-years.aspx>

Case Study: Wind for Schools

The Wind for Schools program was created in 2005 by the U.S. Department of Energy's Wind Powering America program and the National Renewable Energy Laboratory (NREL). It is implemented in Alaska by the Renewable Energy Alaska Project (REAP) and the Alaska Center for Energy and Power (ACEP). Alaska is one of 11 states with a Wind for Schools program. Alaska Wind for Schools provides classroom visits, teacher training to help implement hands-on curricula, and holds a wind turbine design competition for students in grades 4-12 (KidWind). Additionally, some schools have installed small wind turbines on-site as demonstration projects. There are seven turbines in Alaska that were installed through Wind for Schools, including Begich Middle School in Anchorage. You can check out their electricity output and compare to other wind turbines around the nation on OpenEI.⁷⁵ The program is open to any school in the state who meets the success criteria. Schools across Alaska are currently in various stages of planning. The program is highly dependent on a network of sponsors at the community and state level to both get projects in the ground and to provide long-term support.^{76 77}



⁷⁵ http://en.openei.org/wiki/Wind_for_Schools_Portal/Comparison

⁷⁶ <https://alaskarenewableenergy.org/index.php/focusareas/education/wind-for-schools/>

⁷⁷ [http://acep.uaf.edu/projects-\(collection\)/alaska-wind-for-schools-program.aspx](http://acep.uaf.edu/projects-(collection)/alaska-wind-for-schools-program.aspx)

Outreach and Education

2040 Vision: Anchorage residents and leadership are informed, engaged, and empowered to find community-led climate solutions that bring us to a just and sustainable future.

Objective 25: Utilize effective and inclusive outreach methods to ensure that all Anchorage residents benefit throughout the implementation of all sectors of the Climate Action Plan.

Municipal Liaison: All

Timeline: Ongoing

- A. Action:** Identify and reduce barriers to participation in planning processes as well as new projects and programs. Depending on the event, barriers may include:

Language: Ensure the availability of translators and interpreter services for all outreach events and materials.

Literacy: Provide easy-to-understand materials.

Childcare: Provide childcare at public events.

Transportation: Host events at locations accessible by walking or bus.

Mobility: Ensure that meeting locations are ADA compliant.

- B. Action:** Establish a variety of communication avenues to reach diverse audiences: art, mail, public forums, digital surveys, social media, web and phone apps, door-to-door outreach, etc.

Objective 26: Engage community members, especially underrepresented and underserved communities in the implementation of the Climate Action Plan.

- A. Action:** Deepen, democratize, diversify, and maintain engagement on climate action by building partnerships with community organizations that are not currently engaged in climate action initiatives.

Municipal Liaison: Office of the Mayor

Timeline: Ongoing

Tactics

- Establish a variety of communication avenues to reach diverse audiences: art, mail, public forums, digital surveys, social media, etc.

- B. Action:** Partner with and support existing organizations that currently work on climate justice, climate action, education, and other public service organizations already doing work that aligns with other sectors in the plan.

Municipal Liaison: Office of the Mayor

Timeline: Ongoing

Tactics

- Reach out to project managers to see which organizations have contact with the Municipal agencies and staff and which ones do not. Devote time to all organizations, with an emphasis on those with minimal existing contact.

- C. Action:** Increase visibility of Municipal climate action initiatives.

Municipal Liaison: Office of the Mayor

Timeline: Short-term

Tactics

- Identify existing Municipal projects and programs that will benefit from a single, branded climate action message.
- Develop and sustain an online Anchorage climate action website to provide ongoing access to progress.

Objective 27: Motivate and support Anchorage residents, schools, businesses, community councils, and agencies to help meet the goals of the CAP by reducing their carbon footprint and preparing for climate impacts.

- A. Action:** Partner with community organizations to encourage residents and other entities to reduce their carbon footprint and help meet the goals of the CAP.

Municipal Liaison: Office of the Mayor, Solid Waste Services, Anchorage Public Library

Timeline: Ongoing

Tactics

1. Compile and create accessible materials for web and in-person distribution, including how-to guides and information about trainings, workshops, job opportunities, etc.

- B. Action:** Encourage and support businesses to prioritize reducing their carbon footprint, revitalizing neighborhoods, and preparing for climate impacts.

Municipal Liaison: Office of the Mayor, Solid Waste Services, Anchorage Public Library

Timeline: Ongoing

Tactics

1. Explore incentives to encourage business innovation on climate action.
2. Educate and engage business owners through regular presentations and workshops at business organizations.

- C. Action:** Encourage education about climate change, energy, and outdoor/natural science education through K-12, post-secondary, continuing adult education, and extra-curricular education through (1) inventory of existing curriculum and (2) identifying, incentivizing, and providing materials and resources to educators.

Lead Partner: Anchorage School District

Timeline: Long-term

Tactics

1. Audit and utilize existing curricula/materials already freely available, including the CLEAN Network, Strategic Energy Innovations (SEI), and the AKEnergy Smart curricula.
2. Host climate-related workshops during teacher in-service days and credit courses which all teachers need are excellent areas for workshops.

- D. Action:** Encourage the development of career and technical education programs focused on supporting clean energy and infrastructure jobs (e.g. renewable energy, net zero building, electrification of transportation infrastructure)

Municipal Liaison: Office of the Mayor

Timeline: Long-term

Tactics

1. Promote career pathways, workforce development, and training opportunities within both traditional trades and emerging renewable energy industries that prove effective in reducing carbon emissions.

Implementation and Monitoring

In addition to the objectives identified in each sector of the Climate Action Plan, there are two overarching goals that should be prioritized in order to provide baseline information for tracking and assessing progress on mitigation and adaptation actions.

- Complete a greenhouse gas inventory and update annually to assess progress towards climate goals.
- Develop a framework for selecting, monitoring, and regularly disseminating indicators that track 1) environmental changes associated with climate change, 2) impacts of climate change and relevant socio-demographic and geographic information, and 3) adaptation measures and their effectiveness in Anchorage.

The keys to effective implementation of the Climate Action Plan are **leadership** and **accountability**. The leadership bodies who will oversee the implementation of the plan as well as their activities and expectations are outlined below.

- **Resilience Sub-Cabinet** that includes representatives from each Municipal department and is chaired by the Municipal Energy and Sustainability Manager
 - Quarterly meetings to review implementation responsibilities, report on progress, and discuss challenges
 - Develop annual Climate Action Plan progress report
 - Update the Climate Action Plan every 5 years and submit to Assembly for consideration and approval
 - Recognize energy efficiency and life cycle cost as criteria in budget decisions
- **Climate Action Leadership Council** that includes a variety of representatives from entities such as the Resilience Sub-Cabinet, the university, non-profit, state government, tribal entities, and local businesses. Activities include:
 - Convene annually to review and approve annual Climate Action Plan progress report
 - Make annual recommendations for priority actions
 - Review and approve the updated Climate Action Plan every 5 years and participate in the update as necessary
 - Provide consultation on equity considerations during implementation
- **Accountability and reporting**
 - Annual progress report and Climate Action Plan updates will be available on a public website maintained by Municipal Office of Energy and Sustainability.

The implementation of the objectives and actions outlined in the Climate Action Plan will require creative financing mechanisms, many of which are already being assessed by the Municipality. Several of these financing options are described below.

Resources for implementation

- *Financing* -The MOA is exploring a broad range of mechanisms to finance this effort. The Municipality is studying cities worldwide that have developed creative financing options for climate action. Many actions in this plan are financially attractive and provide a positive return on investment (ROI). Investor financing, donor grants, and cross-sector partnerships have allowed communities to finance projects with means beyond a city budget. New revenue from property value increases and permitting fees can be expected when property improvements such as energy efficiency and renewable energy are incentivized or encouraged.

The Cost of Doing Nothing: Anchorage will bear a large financial burden due to climate change effects on the scale of \$150 million or more annually.⁷⁸ Planning and preparation will ease that burden. Further, with an estimated 20% annual energy savings across the board, residents, businesses and public entities have a great opportunity when it comes to investing in energy efficiency and renewable energy. Investing in Anchorage and its residents will not just keep money in the local economy, but will also foster local jobs and a thriving population.

- The *Equity Implementation Guide* provides guidance for Municipal departments on how to incorporate equity considerations as they implement the projects, programs, and policies outlined in the Climate Action Plan. It includes tools for equity analysis, stakeholder identification, community engagement, and evaluation.

⁷⁸ <http://www.pnas.org/content/114/2/E122>

How was the Climate Action Plan developed?

The need for a Climate Action Plan for the Municipality of Anchorage has been recognized for well over a decade. An initial plan was developed in 2008 but never put into effect. In December 2017, the Municipality of Anchorage and the University of Alaska Anchorage (UAA) signed a Memorandum of Understanding supporting collaboration on community opportunities and challenges. The development of the Climate Action Plan is the first such collaboration, providing a framework for policies that reduce emissions and support adaptation actions that reflect the values of Anchorage as an equitable, resilient community.

A small group of University and Municipal staff began with a comprehensive survey of climate action plans from other cities across the U.S. They then recruited a diverse group of faculty, staff and students; representatives from non-profit, governmental, and community-based organizations; residents; and Municipal staff to develop the specific recommendations in the plan. In parallel, a community engagement strategy was implemented that provided multiple opportunities for residents to engage in the planning process.

Key advisory and plan development groups

To develop the Climate Action Plan, there were four key groups: Steering Committee, Advisory Committee, Working Groups, and the Anchorage community.

The **Steering Committee**, made up of University of Alaska and Municipality of Anchorage staff, was formed to create the framework for the Climate Action Plan, design and implement the technical sessions, develop and recruit the Advisory Committee and working group membership, plan and run community engagement meetings, and oversee the development of the plan.

The **Advisory Committee** was composed of a group of technical advisors with a wide range of experiences and expertise representing the Climate Action Plan sectors as well as community-based organizations focused on advancing equity and representing a constituent base that reflects the diversity in Anchorage. The committee's role was to review drafts of the plan, ensure that the themes of equity and economic prosperity were incorporated throughout, and catalyze rapid implementation of the plan.

Seven **working groups** were developed to represent the seven sectors (e.g. Buildings and Energy, Land Use and Transportation) of the Climate Action Plan. University of Alaska and Alaska Pacific University faculty were identified to serve as working group leads. Municipality of Anchorage staff, other UAA faculty, staff and students, non-profit representatives, and state and federal government employees made up the rest of the working group members. Through a series of four technical sessions, the working groups developed the first draft of the objectives and actions in the plan as well as the narrative text in each of the seven sector chapters of the plan.

The **Anchorage community** was involved throughout the development of the Climate Action Plan. Community comments were included along with input from Municipal staff and the Advisory Committee to help identify priority actions. Community input was analyzed and considered while developing the overarching goals, vision, and targets as well as the actions and implementation strategies (See Appendix for list of community engagement events). As of February 25, 2019 approximately 900 residents had been engaged through a variety of presentations, open houses, and workshops.

Incorporating climate equity into the Climate Action Plan development

From the beginning of the writing process, equity was emphasized as a core value of the Climate Action Plan, and all working group members participated in an equity training from the UAA Office of Equity and Compliance at the first technical session. Working groups were instructed to think about how to advance equity goals as they drafted objectives and actions. In addition, the Advisory Committee was tasked with ensuring that equity was incorporated as an overarching theme throughout the plan. Advisory Committee members reviewed the draft chapters and made revisions based on a list of six equity considerations adapted from Portland Climate Action through Equity⁷⁹ and the Austin Climate Resilience Plan⁸⁰:

1. Disproportionate impacts

Are there unintended consequences or negative impacts of this action to racial and ethnic communities, limited English proficient individuals, low-income populations, older adults, or people with disabilities? If yes, how do we mitigate these impacts?

2. Shared benefits

Are racial, ethnic, low-income communities, older adults or people with disabilities positively affected by the action? Will it help build community capacity? Is there a missed opportunity to reduce existing disparities?

3. Accessibility

Are the benefits of the proposed action broadly accessible to households and businesses throughout the community — particularly racial and ethnic communities, limited English proficient individuals, low-income populations, older adults, people with disabilities, and minority, women and emerging small businesses?

4. Engagement and Relationship Building

How does the proposed action promote a) meaningful and culturally appropriate engagement of those most impacted, and b) building of effective, long-term relationships and trust between diverse communities and local government?

5. Alignment and Partnership

Does the proposed action align with and support existing priorities for racial and ethnic communities, limited English proficient individuals, low-income populations, older adults, and people with disabilities, creating an opportunity to leverage resources and build collaborative partnerships?

6. Economic opportunity

Does the proposed action support communities of color and low-income populations through workforce development, contracting opportunities, or the increased diversity of municipal staff?

While the recommendations were drafted with equity considerations in mind, the manner in which the actions are implemented will have a more significant impact on underserved and underrepresented communities. For this reason, the Steering Committee adapted Portland's Bureau of Planning and Sustainability Equity Toolkit to create an *Equity Implementation Guide* that will be used by Municipal staff and partners to ensure that equity is incorporated during the implementation of all actions in the Climate Action Plan.

⁷⁹ <https://www.portlandoregon.gov/bps/article/583501>

⁸⁰ City of Austin Office of Sustainability, personal communication, July 12, 2018

Appendices

Municipal Liaisons and Potential Partners

Municipal Departments

| Name | Acronym |
|-----------------------------------------------------------|----------------|
| Anchorage Assembly | |
| Anchorage Fire Department | AFD |
| Anchorage Community Development Authority | ACDA |
| Anchorage Health Department | AHD |
| Anchorage Metropolitan Area Transportation Solutions | AMATS |
| Anchorage Police Department | APD |
| Anchorage Public Library | APL |
| Anchorage Water and Wastewater Utility | AWWU |
| Building Safety | |
| Code Enforcement | |
| Development Services Department | |
| Finance Department | |
| Geographic Data and Information Center | GDIC |
| Heritage Land Bank | HLB |
| Innovation Team | i-Team |
| Local Emergency Planning Committee | LEPC |
| Maintenance and Operations | M&O |
| Maintenance and Operations (Street Maintenance) | |
| Municipal Light and Power | ML&P |
| Municipal Manager | |
| Office of Economic and Community Development | OECD |
| Office of Emergency Management | OEM |
| Office of Energy and Sustainability | OES |
| Office of Management and Budget | OMB |
| Office of the Mayor | |
| Parks and Recreation | P&R |
| Planning Department | |
| Planning and Zoning Commission | |
| Permitting | |
| Port of Alaska | POA |
| Project Management and Engineering | PM&E |
| Project Management and Engineering (Watershed Management) | |
| Property Appraisal Division | |
| Public Transportation Department | PTD |

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|---------------------------|-----|
| Purchasing Department | |
| Real Estate Department | |
| Solid Waste Services | SWS |
| Traffic Department | |
| Youth Advisory Commission | |

Partner Organizations

| Full Name | Abbreviation |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Alaska Botanical Garden | |
| Alaska Chinese Association | |
| Alaska Climate Action Network | AK CAN! |
| Alaska Department of Commerce, Community, and Economic Development (including Division of Community and Regional Affairs) | AK DCCED |
| Alaska Department of Environmental Conservation (including Division of Air Quality and Public Information Officer) | AK DEC |
| Alaska Department of Fish and Game | ADF&G |
| Alaska Department of Health and Social Services (including Office of the State Veterinarian, Section of Epidemiology, Public Information Officer, and Chronic Disease Prevention and Health Promotion) | AK DHSS |
| Alaska Department of Labor and Workforce Development | |
| Alaska Department of Military and Veterans Affairs Division of Homeland Security and Emergency Management | AK DHSEM |
| Alaska Department of Natural Resources (including Division of Forestry, Division of Parks and Recreation, Division of Agriculture, Community Forestry Program, and Plant Materials Center) | AK DNR |
| Alaska Department of Transportation and Public Facilities | AK DOT&PF |
| Alaska Disabilities Advisory Group | |
| Alaska Energy Authority | AEA |
| Alaska Farmers Market Association | |
| Alaska Federation of Filipino Americans, Inc. | AFFA |
| Alaska Federation of Natives | AFN |
| Alaska Food Policy Council | AFPC |
| Alaska Housing Finance Corporation | AHFC |
| Alaska Humanities Forum | |
| Alaska Institute for Justice | AIJ |
| Alaska Literacy Program | ALP |
| Alaska Marine Conservation Council | AMCC |
| Alaska Master Gardeners | |
| Alaska Native Medical Center | ANMC |
| Alaska Native Science & Engineering Program | ANSEP |
| Alaska Native Tribal Health Consortium (including Local Environmental Observer (LEO) Network) | ANTHC |
| Alaska Pacific University (including Outdoor Studies Wilderness First Responder Program) | APU |
| Alaska Railroad | |
| Alaska Seafood Marketing Institute | ASMI |

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| Alaska State Legislature | |
| Alaska Vocational Technical Center | AVTEC |
| Alaska Waste | |
| Alaska Youth for Environmental Action | AYEA |
| Alaskans for Litter Prevention and Recycling | ALPAR |
| American Institute of Architects | AIA |
| American Red Cross of Alaska | |
| Anchorage Chamber of Commerce | |
| Anchorage Community Land Trust | ACLT |
| Anchorage Community Mental Health Services, Inc. | |
| Anchorage Economic Development Corporation | AEDC |
| Anchorage Home Builders Association | AHBA |
| Anchorage Park Foundation | APF |
| Anchorage Recycling Center | |
| Anchorage School District | ASD |
| Anchorage School Garden Network | |
| Anchorage Waterways Council | |
| Arctic Harvest Deliveries | |
| Asian Alaskan Cultural Center | |
| Association of Alaska Housing Authorities | |
| Audubon Alaska - National Audubon Society | |
| Bike Anchorage | |
| Building Owners and Managers Association | BOMA |
| Camp Fire Alaska | |
| Campbell Creek Science Center | |
| Catholic Social Services (including Refugee Assistance and Immigration Services) | CSS |
| Central Environmental Inc. | |
| Charlie's Produce | |
| Cold Climate Housing Research Center | CCHRC |
| Cook Inlet Region, Inc. | CIRI |
| Cook Inletkeeper | |
| Chugach Electric Association | CEA |
| Church of Love | |
| Connecticut Green Bank | |
| Defend the Sacred Alaska | |
| Doyon Utilities | |
| Eklutna, Inc. | |
| Fairbanks Metropolitan Area Transportation System | FMATS |
| Federation of Community Councils | FCC |
| Federal Emergency Management Agency | FEMA |
| First Alaskans Institute | |
| Food Bank of Alaska | |

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|-----------------------------------------------------------------------------------------------------------------------|-------|
| The Food Corridor | |
| Get Outdoors Anchorage Coalition | |
| Green Star | |
| Great Land Trust | |
| Hispanic Affairs Council of Alaska | |
| Joint Base Elmendorf-Richardson | JBER |
| King Tech High School | |
| Matanuska Electric Association | MEA |
| Matanuska-Susitna (Mat-Su) Borough | |
| National Association for the Advancement of Colored People | NAACP |
| National Guard | |
| National Oceanic and Atmospheric Administration | NOAA |
| National Weather Service | NWS |
| Native Movement | |
| Native Village of Eklutna | |
| Nordic Skiing Association of Anchorage | NSAA |
| North Pacific Research Board | NPRB |
| Off the Chain | |
| Older Persons Action Group | |
| Polynesian Community Center | |
| Rising Tide Communications | |
| Regulatory Commission of Alaska | RCA |
| Renewable Energy Alaska Project | REAP |
| Salvation Army Alaska Division | |
| Spork Consulting | |
| Sol de Medianoche | |
| State of Alaska | SOA |
| The Alaska Center | |
| Ted Stevens Anchorage International Airport | TSAIA |
| University of Alaska Anchorage (including Center for Conservation Science, Small Business Development Center) | UAA |
| University of Alaska Fairbanks (including Cooperative Extension and Scenarios Network for Alaska and Arctic Planning) | UAF |
| United States Department of Agriculture | USDA |
| U.S. Department of Energy | USDOE |
| United States Geological Survey | USGS |
| U.S. Fish and Wildlife Service | USFWS |
| Valley Transit | |
| YWCA Alaska | |

Related Municipal and Community Plans and Reports

- All Hazards Mitigation Plan Update - *The MOA is vulnerable to a wide range of natural, technological, and human/societal hazards. While we typically cannot eliminate hazards, hazard mitigation activities are those that reduce or eliminate the long-term risk to property and human life from hazards.*
- AMATS Complete Streets - *This policy is a commitment that future AMATS projects will take into account the needs of all users as early as practicable and throughout the transportation planning process.*
- Anchorage 2020 Comprehensive Plan - *The Anchorage Bowl Comprehensive Plan, adopted by the municipal Assembly on February 20, 2001 and amended on September 10, 2002, is a blueprint for development in the Anchorage Bowl during the next 20 years.*
- Anchorage 2040 Land Use Plan - *The Anchorage 2040 Land Use Plan is a targeted update to the Anchorage 2020—Anchorage Bowl Comprehensive Plan. The Anchorage 2040 Land Use Plan (2040 LUP) updates population and economic forecasts for city growth and land needs through the year 2040 and includes a Land Use Plan Map.*
- Anchorage Community Health Needs Assessment 2015 - *The purpose of this effort, led by Providence and in collaboration with community partners, is to better understand and address the health needs of Anchorage. Providence, in its commitment to its Mission and desire to create healthier communities together, conducts a CHNA for Anchorage at least once every three years.*
- Anchorage Energy Landscape and Opportunities Analysis - *This report combines technical, economic, and institutional perspectives to apply an energy landscape analysis toward assessing the current status, opportunities, and challenges for energy efficiency, renewable energy, and community-based economic development for Anchorage.*
- Anchorage Forestland Assessment and Management Plan (Draft) - *The overarching intent of the Anchorage Forestland Management Plan is to: Preserve and enhance Anchorage's natural and developed forest and the benefits they provide that are critical to the quality of life of residents, visitors, and wildlife.*
- Anchorage Non-motorized Transportation Plan - *A comprehensive effort to examine the opportunities to increase and expand multi-modal facilities, for both recreation and transportation, throughout the city of Anchorage, Alaska.*
- Anchorage Transit System Report Card - *This report analyzes all three services (People Mover, AnchorRides, and Rideshare) of the Public Transportation Department (PTD) one year after implementation of the new bus system. Data from this report will be used as a baseline and a starting point to have conversations with the community and help establish where we go from here.*
- Anchorage Vision Zero Action Plan - *The Municipality of Anchorage is applying a systems-based approach to develop a Vision Zero Action Plan – fatal and serious injury data for all modes of transportation have been gathered and analyzed to understand traffic safety issues and prioritize resources based on evidence of the greatest needs and impact.*
- Anchorage Wetlands Management Plan - *The purpose of this document is (1) to provide accurate mapping and assessment of freshwater wetlands within the Municipality; (2) to provide a hierarchy of values for wetland units based on function; and (3) to derive management strategies that balance wetland integrity and function while allowing development that would not cause more than minimal adverse impacts.*
- AWWU Strategic Plan - *This plan supports the mission of AWWU through a framework of progressively more specific goals, objectives, and tasks.*
- Comprehensive Emergency Operations Plan - *This plan is designed to provide general information about how the Municipality of Anchorage (MOA) will conduct and respond during times of disaster.*
- FEMA Risk Report, Region X- Municipality of Anchorage - *The Report has two goals: (1) inform communities of their risks related to natural hazards; and (2) enable communities to*

take action to reduce their risks. State and local officials can use the data provided here to update local plans, communicate risk, inform modifications to development standards, identify mitigation projects, and ultimately take action to reduce risk.

- Key Insights on Business, State, and City Collaboration for a Resilient Anchorage - Summary of key insights from a workshop in March 2016 focusing on opportunities for collaboration in building a climate-resilient Anchorage between business leaders, city, state, federal and tribal officials, nonprofit organizations, and other experts.
- LED Streetlight Retrofit Project Storymap - Investing in energy efficient public lighting saves taxpayers money and will reduce our energy demand.
- Metropolitan Transportation Plan 2040 - MTP 2040 is the blueprint document of recommended transportation improvements over the next twenty years, and is updated every four years by the Anchorage Metropolitan Area Transportation Solutions (AMATS).
- Municipality of Anchorage Community Wildfire Protection Plan - Documents the Anchorage Fire Department progress in mitigating the risks and hazards of wildland fire and projecting its goals for the next three years.
- PM&E Design Criteria Manual - The Design Criteria Manual (DCM) provides guidance on design and standards for streets, drainage, landscaping, trails, lighting, traffic control, public transportation, and plans & specifications across the Municipality.
- SWS Master Plan Executive Summary - The development of an integrated solid waste master plan was authorized in order to optimize the system and assets through improved operational efficiencies, capital improvements and new practices and programs. Goals of the plan include increasing the life of the landfill, improving customer service, protecting the environment and establishing sustainable waste reduction, reuse and recycling programs in Anchorage.
- Welcoming and Resilient Roadmaps - Our roadmap for an equitable, inclusive, diverse Anchorage and a roadmap for success and innovation in a time of environmental and economic transformation.

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Community Engagement Strategy

The Steering Committee used a public website (www.muni.org/ClimateActionPlan), a Climate Action Plan listserv, social media, the Federation of Community Councils newsletter, and community partners to inform residents about the plan, upcoming events, and other opportunities to provide feedback. The Steering Committee hosted a series of public events to solicit community ideas for the plan and feedback on draft objectives and actions:

- UAA Center for Community Engagement and Learning Resilient Cities Workshop
- Climate Action Plan Community Kickoff at Loussac Library
- Pop-up Climate Conversations Table at Anchorage Museum
- UAA Center for Community Engagement and Learning Think Tank Discussion
- Climate Action Plan Open House at the Anchorage Museum
- Building a Brighter Anchorage Vision Workshop at Mountain View Neighborhood Library

In order to make it easier for people to get involved with the climate action planning process and include perspectives from all across Anchorage, the Steering Committee offered to bring these presentations and workshops directly to community organizations. These “mobile climate workshops” were tailored specifically for the organization.

Mobile Climate Workshops

Airport Heights Community Council
Alaska Energy Efficiency Partnership Meeting
Alaska Forum on the Environment
Alaska Marine Policy Forum
Alaska Pacific University course, *Climate Change*
Alaska Seeds of Change
Alaska Trucking Association
Anchorage Business Forum
Anchorage Chamber of Commerce “Make It Monday” Forum
Chugiak-Eagle River Chamber of Commerce
Fairview Community Council
Federation of Community Councils
Health and Human Services Commission
Hillside Community Council
Huffman O'Malley Community Council
NAACP Anchorage Branch
Scenic Foothills Community Council
Solid Waste and Recycling Advisory Commission
St. John's United Methodist Church
Turnagain Community Council
UAA Engineering Seminar
UAA Environmental Studies course, *Environmental Planning*
Youth Advisory Commission