

Climate Change and Adaptation

Climate change, accelerated largely by human-caused greenhouse gas emissions, is disrupting global weather patterns and threatening communities across the world. While climate shifts have occurred in the past, current climate change is happening at a faster rate than any recorded in history. Changes to the climate system have been noted through observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level (Intergovernmental Panel on Climate Change 2019). At the same time, weather patterns have become more extreme, with more intense and longer droughts, more extreme precipitation events, and increased heat waves.

Climate models predict further decreases in annual precipitation and an increase of 5°F in the average temperature in Coconino County by 2050 (CLIMAS 2017). The projected increases in temperature and volatility are likely to result in changes to Flagstaff's regional forests, our vegetation and animal communities, and our community's systems and infrastructure.



Photo credit: Coconino National Forest

Local Climate Change Impacts

Flagstaff and Coconino County have seen warming since the mid-1980's, and will continue to see increased temperatures and aridity, or dryness. Key issues that the Flagstaff region must address include the following:

- Increasing temperatures, particularly an increase in minimum temperatures, or overnight lows;
- An increase in aridity and drought, leading to depleted soil moisture;
- Decreasing water supplies and a reduction in annual snowpack and decrease in snowmelt;
- Increasing risk of wildfire and tree mortality, and an increased frequency and altered timing of flooding;
- Impacts on the region's unique tourism and recreation opportunities and its land use systems, housing, and infrastructure;
- Increased risk to public health and increased vulnerabilities of lower income families, Black communities, Indigenous communities communities of color, and the elderly.

Climate Action: Mitigation, Adaptation and Equity

The region has historically faced climate risks, including forest fires, record warming, snow storms, high winds, flooding, and drought. These events affect every resident, though different communities experience climate change in different ways. As the regional climate changes, these risks will become more frequent and severe.

The effects of these extreme events may be lessened with preventative measures. Flagstaff's climate objectives in mitigation, adaptation and equity were established in the Flagstaff Climate Action and Adaptation Plan (2018) and then updated in the Flagstaff Carbon Neutrality Plan (2021). These documents outline three types of climate action:

- **Mitigation** actions reduce the severity of climate change by decreasing greenhouse gas emissions and limiting their concentration in the atmosphere. The Flagstaff region has the opportunity to help mitigate the changes in climate, by reducing emissions from transportation, building energy use, water use, consumption of goods and waste disposal.
- **Adaptation** actions prepare for the effects of climate change by understanding the increased potential of wildfire, flooding, drought, and major community change, and then building resilience to short term hazards and long term change.
- **Equity** actions reduce the unequal burdens created by climate change. Flagstaff can address climate change in a manner that prioritizes the vulnerable communities most impacted and ensures the costs and benefits of climate adaptation and mitigation are equitably distributed.

At the community level, mitigation investments include reclaimed water and conservation; building energy efficiency and electrification; active transportation such as biking and walking; building complete and connected neighborhoods; local food production; renewable energy; reducing waste; and landfill emissions management. Increasing resilience will require investing in critical public infrastructure such as stormwater and transportation systems to handle increases in volatility, and preparing the community for increases in extreme weather events, flooding, wildfires, and community change (refer to the 2012 City of Flagstaff Resiliency and Preparedness Study).

For the purposes of the Flagstaff Regional Plan, how we develop land will have a significant impact on our greenhouse gas emissions and the mitigation of climate change.

CLIMATE CHANGE AND ADAPTATION GOALS AND POLICIES

Goal E&C.2. Achieve carbon neutrality for the Flagstaff community by 2030.

Policy E&C.2.1. Encourage the reduction of energy and material consumption.

Policy E&C.2.2. Promote investments that create a connected and efficient community, decrease emissions from transportation and building energy, and strengthen climate resiliency.

Policy E&C.2.3. Review and revise existing regulations, standards, and plans (codes, ordinances, etc.) to reduce community greenhouse gas emissions.

Policy E&C.2.4. Promote developments that help the community achieve carbon neutrality through strategies that reduce the project's emissions from transportation, energy, and consumption.



Goal E&C.3. Prepare Flagstaff's community systems and resources to be more resilient to climate change impacts, and address climate change in a manner that prioritizes those most impacted and ensures the costs and benefits of climate adaptation and mitigation are equitably distributed.

Policy E&C.3.1. Develop and implement a comprehensive and proactive approach to prepare the community for and to minimize the impacts of climate change induced hazards.

Policy E&C.3.2. Review and revise existing regulations, standards, and plans (codes, ordinances, etc.) to reduce the community's vulnerability to climate change impacts and reduce the disproportionate impacts on vulnerable communities.

Policy E&C.3.3. Invest in forest health and watershed protection measures.

Policy E&C.3.4. Increase the region's preparedness for extreme climate events.

Policy E&C.3.5. Improve the ability of vulnerable community members to adapt and thrive amidst the pressures of climate change.

Policy E&C.3.6. Attempt to equitably distribute the burdens and benefits of climate action policies and investments to all segments of the community.

Goal E&C.4. Integrate available science into policies governing the use and conservation of Flagstaff's natural resources.

Policy E&C.4.1. Assess vulnerabilities and risks of Flagstaff's natural resources in the context of anticipated climate changes and resulting changes to Flagstaff's systems.

Policy E&C.4.2. Develop water use policies that attempt to integrate current best projections of climate change effects on the Colorado Plateau's water resources and emphasize conservation.

Corridors serve many roles, and these roles may be understood as:

- Carrier of goods and people – how many, how far, what kind, what means
- Connector of activities – how active, what scale, what purpose, relationships
- Space and Shelter for activities within the public realm – how often, vulnerable, duration, solitude
- Symbol for the understanding of place – identity, purpose, behaviors as it applies to specific roads or corridors, not to classes of corridors.
- Builder and destroyer of city and place – corridors may be perceived as supporting a sense of place, or destroying it.

To fully implement the Regional Plan’s vision for Flagstaff’s roadways a Flagstaff “Streets Master Plan” should be developed to serve as the specific plan that bridges the City’s *Engineering Design Standards and Specifications* and the *Flagstaff Regional Plan*. Until such a Plan is developed, functional classifications for roads and their definitions can be found in the *Engineering Design Standards and Specifications*.



Photo credit: City of Flagstaff

Corridors in the Regional Transportation Plan

The Regional Transportation Plan (RTP) is a five year planning document developed by the Flagstaff Metropolitan Planning Organization. It is used to identify roadway projects that are eligible for federal funding. Some of the future roads identified on Map 25 are also identified in the RTP, however, these two documents are not required to match. The RTP provides more detail about the stage of planning for each roadway. Some future corridors are considered “conditional roads” in the RTP, which means that further study is required before proceeding with a project. Examples include the Clay Avenue Extension, the US 89 Bypass, the Metz Walk Extension, etc.

AUTOMOBILE GOALS AND POLICIES

Goal T.8. Establish a functional, safe, and aesthetic hierarchy of roads and streets.

Policy T.8.1. Promote efficient network connectivity to and within major trade corridors, employment centers, and special districts that enhances the region’s standing as a major economic hub.

Policy T.8.2. Maintain the road and street classification system that is based on context, function, type, use, and visual quality.

Policy T.8.3. Design neighborhood streets using appropriate traffic calming techniques and street widths to sustain quality of life while maintaining traffic safety.

Policy T.8.4. Protect rights-of-way for future transportation corridors.

Policy T.8.5. Support the area’s economic vitality by improving intersection design for freight movements.

Policy T.8.6. Maintain the City’s street infrastructure in a cost effective manner to ensure the safety and convenience of all users.



TRACKED CHANGES – REGIONAL PLAN TEXT AMENDMENT

Pages IV-11 and IV-12

Climate Change and Adaptation

Climate change, accelerated largely by human-caused greenhouse gas emissions, is disrupting global weather patterns and threatening communities across the world. While climate shifts have occurred in the past, current climate change is happening at a faster rate than any recorded in history. Changes to the climate system have been noted through observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level (Intergovernmental Panel on Climate Change ~~2007~~, 2019¹). At the same time, weather patterns have become more extreme, with more intense and longer droughts, more extreme precipitation events, and increased heat waves.

~~Many climate~~ Climate models predict further decreases in annual precipitation and ~~increased temperatures~~ an increase of 5°F for in the average temperature in Coconino County by 2050²our region, which in turn- (CLIMAS). The projected increases in temperature and volatility are likely to result in changes to Flagstaff's regional forests, our vegetation and animal communities, and our community's systems and infrastructure ~~as well as declines in agricultural productivity and food security.~~ Climate change calls for a coordinated response by communities and governments across the world to minimize future global warming while simultaneously adapting to the changes we cannot prevent. If the increasing amount of greenhouse gases in the atmosphere is not reduced, life as we understand it will be irreversibly altered.

Local Climate Change Impacts

~~Recent warming in the Southwest has resulted in declines in spring snowpack and Colorado River flow.~~ Flagstaff and Coconino County have seen warming since the mid-1980's, and will continue to see increased temperatures and aridity, or dryness. Key issues that ~~the Southwest, including~~ the Flagstaff region, must address include the following:

- Increasing temperatures, particularly an increase in minimum temperatures, or overnight lows;
- An increase in aridity and drought, leading to dDepleted soil moisture;
- Decreasing water supplies and a ;Rreduction in annual snowpack and decrease in snowmelt;
- Depleted soil moisture;

¹ IPCC, 2018: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. 2019.

² CLIMAS, 2017: Climate Profile for the City of Flagstaff [Meadow, A.M, S. LeRoy, J. Weiss, and L. Keith (eds.)]. 2017.

- ~~Increasing temperature, drought, increasing risk of wildfire and, tree mortality, and invasive species and an;~~ increased frequency and altered timing of flooding;
- ~~Impacts on the region's unique tourism and recreation opportunities; and its land use systems, housing, and infrastructure; increasing risks to cities and agriculture from a changing climate~~
- ~~Increased risk to public health and~~ increased vulnerabilities of ~~the~~ lower income families, Black communities, Indigenous communities, communities of color, ~~poor,~~ and the elderly.

Climate ~~Action: Adaptation and~~ Mitigation, Adaptation and Equity

The region has historically faced climate risks, including forest fires, record warming, snow storms, high winds, flooding, and drought. These events affect every resident, ~~and as though~~ different communities experience climate change in different ways. As the regional climate changes, these risks will become more frequent and severe.

~~The effects of these extreme events may be lessened with preventative measures. Flagstaff's climate objectives in mitigation, adaptation and equity were established in the Flagstaff Climate Action and Adaptation Plan (2018) and then updated in the Flagstaff Carbon Neutrality Plan (2021). These documents outline three types of climate action in Flagstaff:~~

- ~~Mitigation of these risks refers to reducing actions reduce~~ the severity of climate change by decreasing greenhouse gas emissions and limiting their concentration in the atmosphere. The Flagstaff region has the opportunity to help mitigate the changes in climate, ~~and by reducing emissions from transportation, building energy use, water use, consumption of goods and waste disposal.~~
- ~~Adaptation actions prepare for simultaneously be ready for its the effects of climate change~~ by understanding the increased potential of wildfire, flooding, drought, and major community change, ~~other effects of climate change~~ and then building resilience to preparing for such short term hazards and long-term change. ~~Individual preparation measures could include preparing our homes for potential fire, implementing stormwater management best practices, and becoming more water efficient. Personal home or business investments in water conservation and stormwater collection, energy efficiencies, walking, biking, bus riding, recycling, re-using, and sharing also contribute to mitigating climate change.~~
- ~~Equity actions reduce the unequal burdens created by climate change. Flagstaff can address climate change in a manner that prioritizes the vulnerable communities most impacted and ensures the costs and benefits of climate adaptation and mitigation are equitably distributed.~~

At the community level, ~~investing mitigation investments include in critical public infrastructure such as reclaimed water and, conservation, and stormwater collection; efficient building energy efficiency and electrification; use of energy resources active self-reliance on transportation options; such as biking and walking; building complete and connected neighborhoods; local food production; renewable and the ability to generate energy by means other than fossil fuels;~~

reducing waste; and landfill emissions management. Increasing resilience will require investing in critical public infrastructure such as stormwater and transportation systems to handle increases in volatility, and protecting and preparing the community for increases in extreme weather events, flooding, wildfires, and community change ~~other natural and human caused hazards are examples of large scale preparation~~ (refer to the 2012 City of Flagstaff Resiliency and Preparedness Study ~~(2012)~~).

For the purposes of the Flagstaff Regional Plan, how we develop land will have a significant impact on our ~~reduction of~~ greenhouse gas emissions and the mitigation of climate change.

CLIMATE CHANGE AND ADAPTATION GOALS AND POLICIES

Goal E&C.2. ~~Reduce greenhouse gas emissions~~ Achieve carbon neutrality for the Flagstaff community by 2030.

Policy E&C.2.1. Encourage the reduction of ~~all~~ energy and material consumption, ~~especially fossil fuel generated energy, in public, commercial, industrial, and residential sectors.~~

Policy E&C.2.2. Promote investments that create a more connected and efficient community, decrease emissions from transportation and building energy, and strengthen climate resiliency.

Policy E&C.2.3. Review and revise existing regulations, standards, and plans (codes, ordinances, etc.) to reduce community greenhouse gas emissions.

Policy E&C 2.4. Promote developments that help the community achieve carbon neutrality through strategies that reduce the project's emissions from transportation, energy, and consumption.

Goal E&C.3. ~~Prepare Flagstaff's Strengthen~~ community systems and resources to be more resilient to climate change impacts ~~natural environment resiliency through climate adaptation efforts~~ and address climate change in a manner that prioritizes those most impacted and ensures the costs and benefits of climate adaptation and mitigation are equitably distributed.

Policy E&C.3.1. Develop and implement a comprehensive and proactive approach to prepare the community for and to minimize the impacts of climate change induced hazards.

Policy E&C.3.2. Review and revise existing regulations, standards, and plans (codes, ordinances, etc.) to reduce the community's vulnerability to climate change impacts and reduce the disproportionate impacts on vulnerable communities.

Policy E&C.3.3. Invest in forest health and watershed protection measures.

Policy E&C.3.4. Increase the region's preparedness for extreme climate events.

Policy E&C.3.5. Improve the ability of vulnerable community members to adapt and thrive amidst the pressures of climate change.

Policy E&C.3.6. Attempt to equitably distribute the burdens and benefits of climate action policies and investments to all segments of the community.

Goal E&C. 4. Integrate available science into policies governing the use and conservation of Flagstaff's natural resources.

Policy E&C. 4.1. Assess vulnerabilities and risks of Flagstaff's natural resources in the context of anticipated climate changes and resulting changes to Flagstaff's systems.

Policy E&C. 4.2. Develop water use policies that attempt to integrate current best projections of climate change effects on the Colorado Plateau's water resources and emphasize conservation.

TRACKED CHANGES – REGIONAL PLAN TEXT AMENDMENT

Pages X-19

Transportation Policy T.8.1 Revision

Tracked Changes:

Policy T.8.1. Promote efficient ~~transportation network~~ connectivity to and within major trade corridors, employment centers, and special districts that enhances the region's standing as a major economic hub.