



City of Flagstaff Climate Action & Adaptation Plan



Climate Action Plans: Overview

Flagstaff Climate Action Council

Rick Moore

Clean Energy and Efficiency Director, Grand Canyon Trust



*Mayors have single-handedly taken action on climate protection efforts and in many cases, creatively launched local energy efficiency programs to help reduce our carbon footprint in American cities
-- U.S. Conference of Mayors*

What actions has the city taken to understand the possible impacts of climate change and to address them?

- 2006 City Council passed the US Mayors Climate Protection Agreement
- 2007 Established the residential energy efficiency program
- 2008 Began annual greenhouse gas inventories
- 2008 Helped establish the Western Adaptation Alliance*
- 2012 Completed the City of Flagstaff Resiliency and Preparedness Study
- 2012 Began the Flagstaff Watershed Protection Project
- 2017 Current Climate Programming
 - *Energy Conservation & Energy Efficiency Programs*
 - *Renewable Energy Installations on City Property*
 - *Continuing to track greenhouse gas emissions*

**The Western Adaptation Alliance was formed to encourage collaboration amongst local government agencies in the southwest and intermountain west region to address climate related impacts unique to arid environments.*



In 2016, the
Flagstaff
Sustainability
Program:

Distributed
\$26,000 in energy
efficiency rebates
to save 242,000
kwh annually

Generated 2,902
MWH of renewable
energy from city
facilities

Hosted seven do-it-
yourself home
energy workshops

In early 2017 the Flagstaff City Council adopted the goal of taking *Meaningful Action on Climate Change*



Actions to achieve the goal include:

- [Develop and Implement a Climate Action Plan](#)
- Become a 100% Renewable Energy City as an Organization and a Community
- Achieve Financial Divestment from Fossil Fuels
- Sponsor and Support State or Federal Legislative Action that Combats Climate Change
- Update the Energy Code



Mitigation

Reducing greenhouse gas emissions. *For example, generating electricity using the wind and sun.*

Adaptation

Responses to the impacts of climate change. *For example, reducing the likelihood of flooding in Flagstaff through the Flagstaff Watershed Protection Project*

Flagstaff Climate Action & Adaptation Plan (FCAAP)



In the spring of 2017, the city's Sustainability Program began the process to develop a climate action plan to submit to the City Council by October 2018.

Recognizing that climate change is already happening, city staff decided to include an adaptation component in the plan.



Before we discuss what a climate and adaptation plan is, there are some concepts, terms, and climate impacts we need to understand



Fire made us human, fossil fuels made us modern, but now we need a new fire that makes us safe, secure, healthy and durable.
-- Amory Lovins
Rocky Mountain Institute

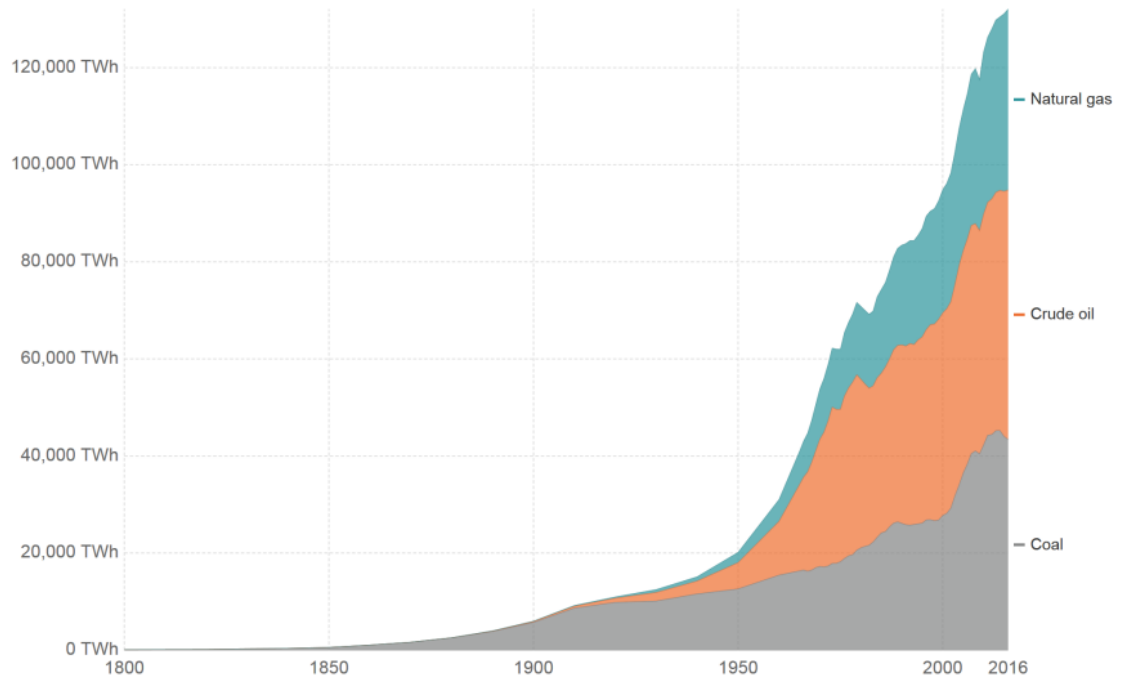


Fossil Fuels

Fossil fuels include coal, oil, and natural gas. They are derived from plants that died millions of years ago and were converted to carbon. When we burn fossil fuels, the carbon is released into the air as carbon dioxide.

Global fossil fuel consumption

Global primary energy consumption by fossil fuel source, measured in terrawatt-hours (TWh).



Source: Vaclav Smil (2017). Energy Transitions: Global and National Perspective & BP Statistical Review of World Energy

OurWorldInData.org/fossil-fuels/ • CC BY-SA



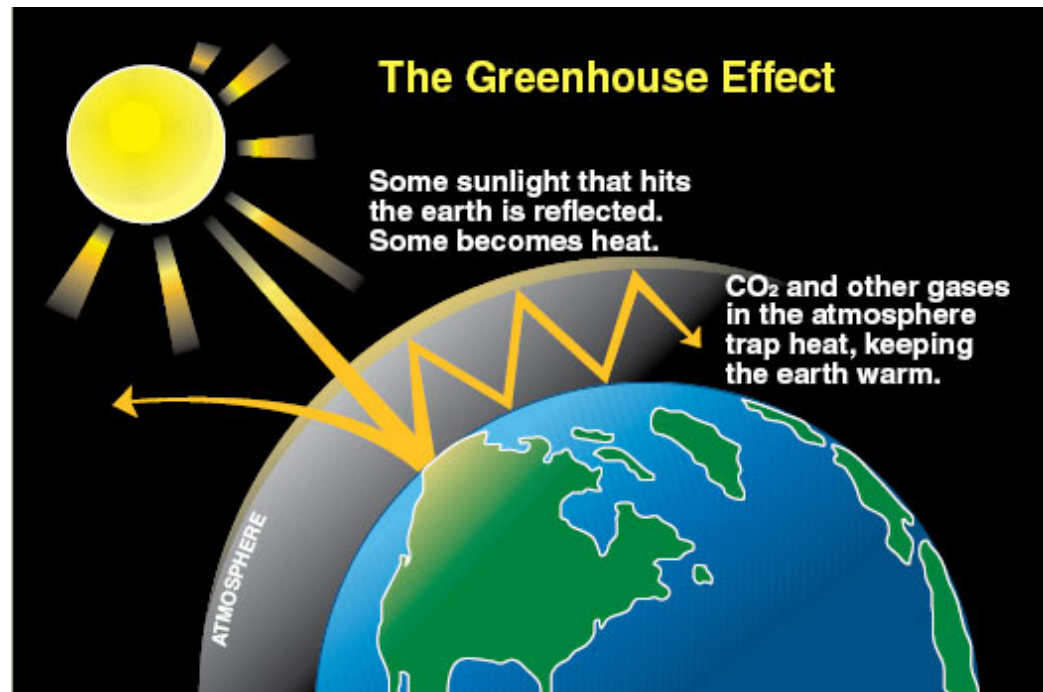
Thin Skin

An average apple is about 225 millimeters around, and its skin is about 3 millimeters thick. If we compare the Earth and its atmosphere to an apple and its skin, the skin of the apple is about 20 times thicker relative to the size of the apple than the atmosphere is to the size of the Earth.

--Decodedscience.org

Greenhouse Gases

Greenhouse gases trap the heat from the surface of the earth when it is warmed by the sun. They act in a similar way to the glass in your car windows, which allow sunlight in to warm the interior of the car, but does not let the warmth escape. While there are other greenhouse gases, **carbon dioxide (CO₂)** is the most prevalent.





Climate vs Weather

The **difference between weather** and **climate** is a measure of time. **Weather** is what conditions of the atmosphere are over a short period of time, and **climate** is how the atmosphere "behaves" over relatively long periods of time.

The standard averaging time for measuring climate is 30 years.

A 30 year period is used, as it is long enough to filter out any inter-annual variation or anomalies, but also short enough to be able to show longer climatic trends

Climate is weather measured over a long period of time

Weather =
clothes for
the day



Climate =
clothes in a
closet





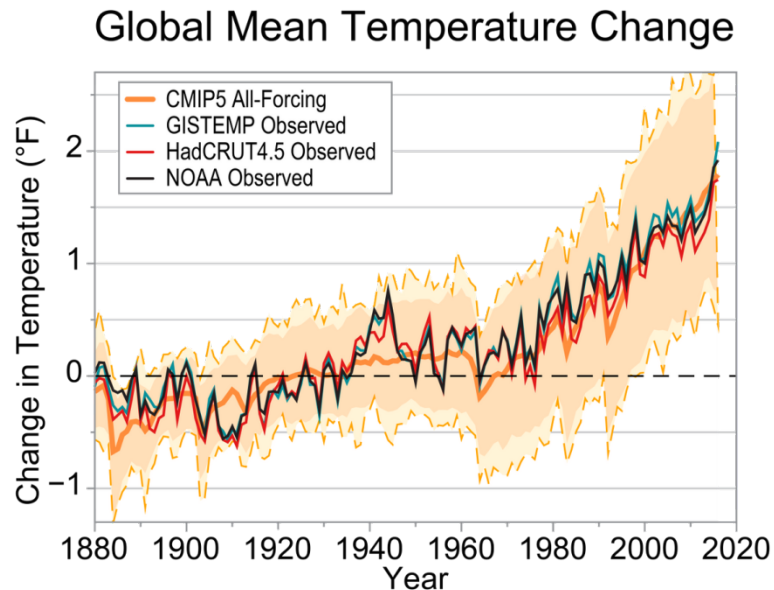
Increasing Temperatures

Multiple observations and studies have found that average global temperatures are increasing. But perhaps a better way to think about it is that as the atmosphere warms, it **contains more energy**, which leads to extreme weather events such as hurricanes, tornadoes, and thunderstorms.

Increased heat, drought, and insect outbreaks, all linked to climate change, have increased wildfires.

Declining water supplies, reduced agricultural yields, health impacts in cities due to heat, and flooding and erosion in coastal areas are additional concerns.

-- *Fourth National Climate Assessment*



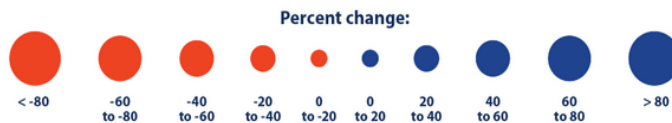
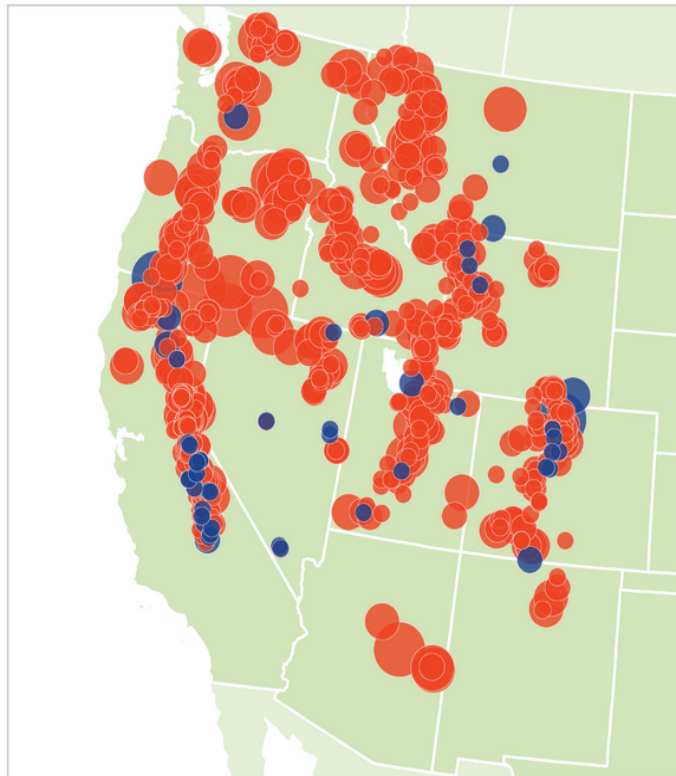


Tourism and recreation, generated by the Southwest's winding canyons, snow-capped peaks, and Pacific Ocean beaches, provide a significant economic force that also faces climate change challenges. **The recreational economy will be increasingly affected by reduced streamflow and a shorter snow season**, influencing everything from the ski industry to lake and river recreation.

-- National Climate Assessment

What Does This Mean for the Southwest and Flagstaff?

Trends in April snowpack in the Western U.S. 1955 - 2016



Snowpack and streamflow amounts are lower than historic averages and are projected to decline further in parts of the Southwest, decreasing surface water supply reliability for cities, agriculture, and ecosystems.

Streamflow totals in the Sacramento-San Joaquin, the Colorado, the Rio Grande, and in the Great Basin were 5% to 37% lower between 2001 and 2010 than the 20th century average flows.



The summer before last, the mosquitoes were so bad that the guests at a July 4th party abandoned the backyard for the inside of the house. Until a few years ago, mosquitoes were virtually non-existent in Flagstaff.



Increased warmth allows West Nile virus-carrying mosquitoes to persist through the winter.

What Does This Mean for the Southwest and Flagstaff?



Increased temperatures and longer warm seasons will also lead to shifts in the distribution of disease-transmitting mosquitoes.

Threats to Health

Projected regional temperature increases will pose increased threats and costs to public health in southwestern cities, which are home to more than 90% of the region's population.

Co-Benefits of Reducing Emissions

Promoting walking and bicycling to reduce emissions from vehicles can help improve health.

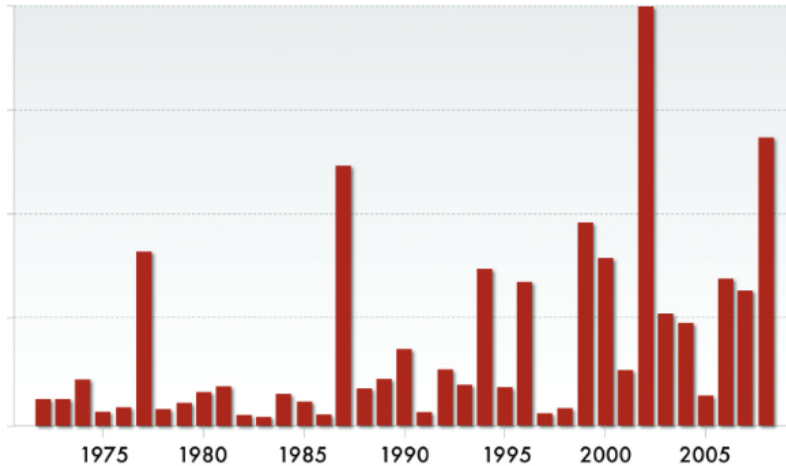
Many actions that reduce greenhouse gas emissions also reduce air pollution, which helps improve health.



Between 1970 and 2003, warmer and drier conditions increased burned area in western U.S. mid-elevation conifer forests by 650%

-- National Climate Assessment

What Does This Mean for the Southwest and Flagstaff?



Area of large wildfires that burned lands dominated by forest and woodland in AZ, CA, NV, NM, and UT.

Increased Wildfire: Increased warming, drought, and insect outbreaks, all caused by or linked to climate change, have increased wildfires and impacts to people and ecosystems in the Southwest. Fire models project more wildfire and increased risks to communities across extensive areas.

Largest Restoration Project in the American West

The goal of the Four Forest Restoration Initiative is to restore natural forest structure and function so that forests are more resilient to climate change.





The city has been tracking emissions from the community and city operations for years. Reports are available online.

CITY OF FLAGSTAFF

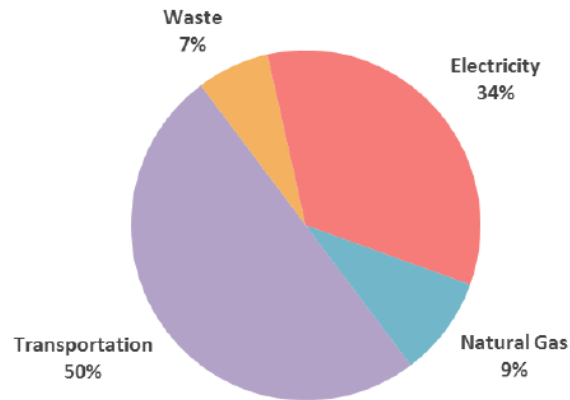
Community Greenhouse Gas Emissions Report 2015 - 2016



www.flagstaff.az.gov/climate

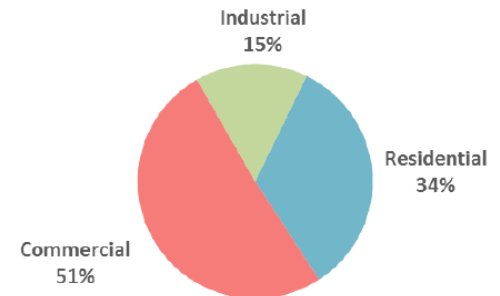
Flagstaff greenhouse gas emissions and energy / fossil fuel consumption

2015 -- 2016 Breakdown by Emission Source



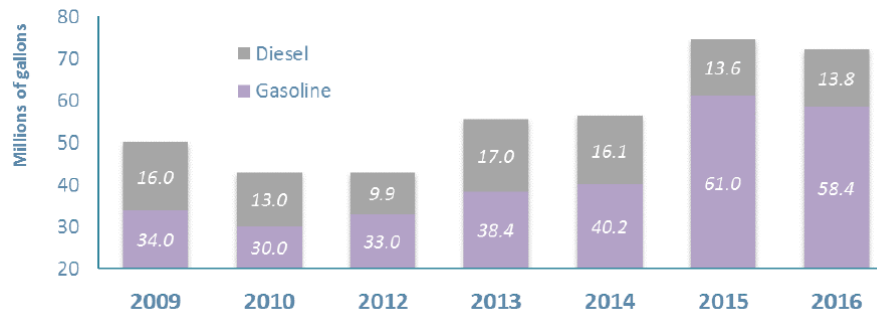
Our total reported emissions were 1,424,526 metric tons

Energy Consumption



All electricity and natural gas purchased in Flagstaff

Gallons of Gasoline and Diesel Consumed





For centuries, cities have helped foster some of mankind's greatest ideas. It is no stretch of the imagination to believe that cities will now take the lead in addressing climate change.

-- C40 CITIES

What's to be Done?

Cities consume over two-thirds of the world's energy and account for more than 70% of global CO2 emissions.

High Country News
How some Western cities are leading on climate action
Despite faltering national policy, some communities are forging ahead.

MOAB SUN NEWS
City aims for 100 percent renewable energy by 2032



The Fort Collins City Council on March 3 unanimously adopted some of the most aggressive goals in the nation to reduce community greenhouse gas emissions

The San Diego Union-Tribune
San Diego's climate change plan gets final OK



Cities adopt the Paris Climate Agreement goals
385 Climate Mayors, representing 68 million Americans, commit to uphold the Paris goals



Climate action plans build upon the information gathered by greenhouse gas inventories and generally focus on those activities that can achieve the relatively greatest emission reductions in the most cost effective manner.

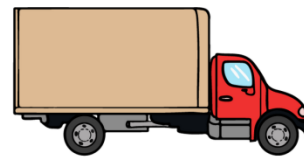
-- Institute for Local Government

So what is a climate action plan?

Major components of a climate action plan usually **measure greenhouse gas emissions, set reduction goals, and develop proposals to achieve them.** Greenhouse gas emissions from the following categories are typically included:



Buildings



Transportation



Waste



Energy Sources



Water



Fort Collins 2016 Accomplishments

Energy efficiency investments in 2016 achieved the savings equivalent to 3,750 homes' electricity needs.

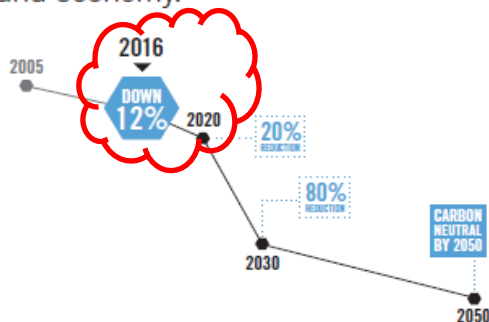
Businesses are saving more than \$9.5M annually from investments they've made in energy efficiency alone.

The community has increased locally-installed solar capacity by almost 3.5 times from 2014 to 2016

Transit ridership increased by 26% between 2015 and 2016.

Do climate action plans work? Do we need one?

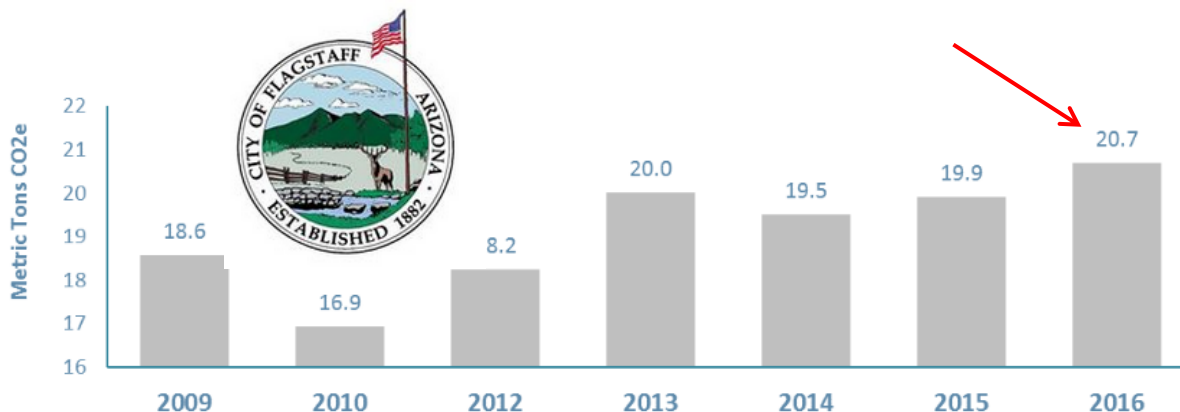
We are more than halfway to our 2020 goal while also growing our population and economy.



2005 to 2016

Look how far we've come with more than a decade of efforts

	2005	2016
COMMUNITY CARBON INVENTORY	2.3 Million Metric Tons CO _{2e}	2.1 Million Metric Tons CO _{2e}
Net reductions: 275,813 Metric Tons (-12%)		
PER CAPITA EMISSIONS	18 Metric Tons CO _{2e} per person	13 Metric Tons CO _{2e} per person
Per capita reductions: 5 Metric Tons per person (-28%)		



*CO_{2e} means "carbon dioxide equivalents," and is the standard translation of all types of greenhouse gases into the amount of carbon dioxide which would create the same amount of climate change potential.



Help Avoid Runaway
Costs of Climate
Change

Create Jobs

Compete
Internationally

Improve Public Health

Save households and
Businesses Money

Provide Benefits to
Farmers

Benefit Low Income
Households

Preserve Ecosystems
and Species

Conserve Water

-- *Union of Concerned
Scientists*

What are the benefits of taking action to reduce greenhouse gas emissions?

- The Earth continues to be habitable
- Residents and businesses save money by reducing energy bills for heating, cooling and lighting
- Water is conserved the need for expensive wells and pipelines is reduced
- Road congestion is reduced through more efficient transportation systems
- Air pollution is reduced and public health is improved
- Vulnerability to energy price increases and volatility is reduced
- Less waste is sent to the landfill
- Flagstaff's ability to adapt to a changing climate is significantly improved



Setting Goals

Most climate action plans set goals to reduce greenhouse gas emissions. They are usually in the form of a percentage reduction from a baseline year.



Emission reduction goals for Fort Collins are:

20% below 2005 by 2020

80% below 2005 by 2030

Carbon neutrality by 2050

While the City Council has adopted some goals, additional goals will be developed as part of the *Flagstaff Climate Action and Adaptation Plan*.

***Carbon Neutrality:** Removing as much carbon dioxide from the atmosphere as being put into it, usually through buying credits or sequestering carbon dioxide (in forests for example)



Greenbanks accelerate clean energy market growth while making energy cheaper and cleaner for consumers, driving job creation, and preserving public dollars.

C-PACE is a new way to finance energy efficiency, renewable energy, and water conservation upgrades on commercial properties.

Examples of Potential Actions:

Buildings



- Update the energy code (we currently use the 2009 code)
- Strengthen incentive programs for weatherization and energy-saving technologies (insulation, windows, lighting, appliances, HVAC, etc)
- Work with Arizona Public Service to more strongly support programs to conserve energy
- Consider requirements for rating and communicating the efficiency of homes for sale and for rent.
- Develop funding mechanisms to offset large upfront costs (Greenbank, C-PACE)



Examples of Potential Actions: *Transportation*

Fort Collins Transportation Vision

Reduce vehicles miles travelled by 29%.

Expansion of transit network.

One in two new passenger cars purchased will be electric by 2030.

The remaining new vehicles purchased will be 40% more efficient than the average new stock by 2030.

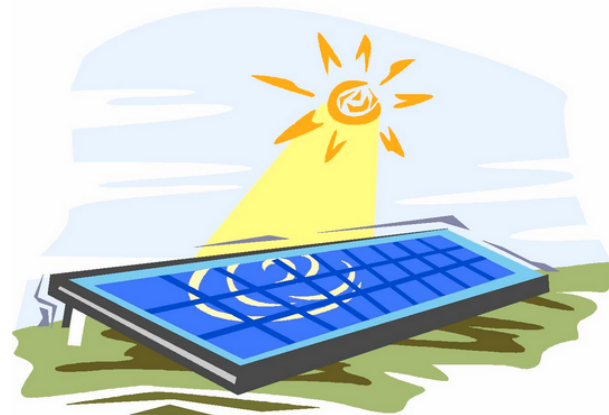


- NAIPTA
 - Increase frequency of service
 - Expand its network
 - Offer real-time public transit data
- Facilitate and support bike share, car share, and ride share programs
- Accelerate the adoption of fuel efficient and electric vehicles
- Install more electric vehicle charging stations
- Work with local dealers to increase electric vehicle stocks



Examples of Potential Actions:

Energy Sources



\$10 million:
Amount annual electricity bills are projected to drop for customers of Iowa's MidAmerican utility, due to increased wind power. The new wind generation will create 460 construction jobs, 48 permanent jobs, and more than \$360 million in new property tax revenue.

- City of Flagstaff: Lead by Example
 - Continue and expand the city's program of installing renewable energy technologies on city facilities
- Create and expand incentive programs for renewable energy projects in Flagstaff
- Work with Arizona Public Service to provide opportunities for local, utility-scale renewable energy projects and the installation of renewable energy technologies on commercial and residential properties
- Develop funding mechanisms to offset large upfront costs (Greenbank, C-PACE)



Engagement Goals

Include:

Promote an understanding of the purpose, motivation, and value of the plan

Obtain community feedback to guide decision-making

Help ensure that the plan provides clear direction for implementation

Timeline for developing the Flagstaff *Climate Action and Adaptation Plan*

2017

November: *Signed a contract with Cascadia Consulting to develop Flagstaff's plan*

December: *GHG inventory review, emission forecast, climate projections*

2018

January: *Hold first community open house*

February: *Further assessment & initial list of options*

March: *Second community open house*

April – June: *Additional analysis and develop draft plan*

July: *Third community open house*

August – September: *Develop final draft plan; seek comments*

October: *Present final plan to City Council for adoption*



Speaking Up

This plan will lead directly to projects and money spent on the ground. It is not just a guidance document; by participating you have an influence on public funding and project implementation.
-- *Cascadia Draft Engagement Plan*

- **The Cascadia contract includes three public engagement events:**
 - **January:** Highlights from the greenhouse gas inventory, climate projections, objective of the plan, opportunities for public involvement and how it will be used
 - **March:** Planning progress, update on proposed strategies, begin developing priorities, identify gaps, express concerns
 - **July:** Present *Draft* plan, gather comments to inform the final revisions
- **City of Flagstaff outreach includes:**
 - Flagstaff Community Forum website
 - Monthly *Coffee & Climate Conversations*
 - One-on-one interviews and meetings with key stakeholders
 - Coordinate with community groups supporting the plan



For More Information

Flagstaff Climate Action Council (FCAC)

flagstaffclimateactioncouncil@gmail.com

Flagstaff Climate Programs

<http://www.flagstaff.az.gov/1732/Climate>

Jenny Niemann

Climate and Energy Specialist, City of Flagstaff

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If you are interested in becoming a member of FCAC, please send an email to the link shown on the right.

FCAC is a working group and members are expected to actively contribute in some way.

If you have a particular area of interest or expertise, please include it.