Issue Up Close:

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Facing the Challenge of Climate Change

> "Historically, Washington has risen to great challenges, and we can meet the challenge of climate change. Our children's future depends on the action we take."
>
> – Gov. Chris Gregoire

Washington is serious about climate change

Washington's climate is changing. We're already seeing the effects: average temperatures have increased, glaciers are melting away, and snow pack in the mountains has decreased.

Washington State is addressing climate change because its impacts go far beyond a change in the weather. Climate shapes everything – ecosystems, crops, water, economy, lifestyles, health – so even small changes can have big impacts. A few degrees in temperature may not feel like much, but it can make the difference between rain and snow, early snowmelt or late, flowing summer streams or dry creek beds.

Our state is vulnerable to a warming climate, especially our snow-fed water supplies and nearly 40 communities along our 2,300 miles of shoreline that are threatened by rising sea levels.

But we have some unique opportunities, too. Because we rely heavily on hydropower, power generation is not as significant a source of "greenhouse gas" emissions as in other states. In Washington, 45 percent of greenhouse gas emissions come from cars, trucks, planes, and ships. This means individuals can help reduce these emissions, which are associated with warming.

Washington has already taken steps toward reducing emissions and building a clean energy economy. We don't have to start from square one. We can use what we've learned to do more. It's clear that Washington's climate is changing. It's also clear that we can help shape how changes in climate change Washington – for us today, for our children, and for future generations.

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More than just a change in the weather

To deal with climate change, it's necessary to know what's involved and what to expect. Our knowledge of climate change is growing rapidly, and scientists already agree on fundamental aspects of climate change.

Washington is getting warmer. According to scientists at the University of Washington, temperatures in our region are rising even faster than the global rate. The Pacific Northwest's average temperature increased 1.5 degrees Fahrenheit during the 20th Century and is expected to rise 1.9 degrees Fahrenheit before 2030.

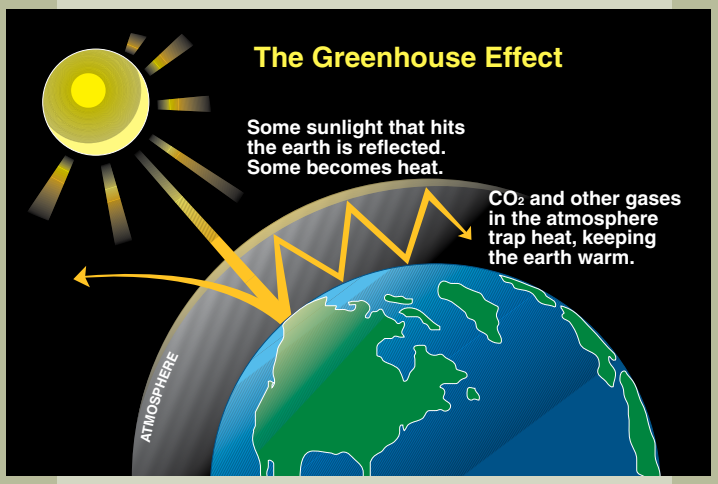
In February 2007, the United Nations Intergovernmental Panel on Climate Change found that it is more than 90 percent likely that the accelerated global warming of the past 50-60 years is due to human contributions to increased levels of "greenhouse gases," such as carbon dioxide, nitrous oxide and methane, in the atmosphere.

By reducing emissions of these gases, we can **reduce our state's contribution to global warming**. But to reduce emissions and deal with the impacts of a changing climate, we have to think and act differently than before. Most of the planning that individuals, businesses and government have done has been based on the climate of the past, and we risk being poorly prepared for future changes. New plans will need to factor in climate change.

To best prepare for, adapt to, and reduce the effects of climate change, we need to consider not only the changes, but also who and what might be affected, and how and why:

- Built systems – roads, utilities, buildings, seawalls, water supply and treatment
- Human/social systems –businesses, emergency response, health care
- Natural systems – plants, pests, animals, people, rivers, fires
- Washington neighbors and trading partners
- Our economy, and future economic opportunities
- Current and future generations, our children and theirs

There will be costs for taking action, and there would be costs if we did not take action. Investing today in cost effective energy conservation and clean energy development can pay off in lower costs – economic, social and environmental – tomorrow. By taking the lead in creating economic opportunities for clean energy, we can help our state's economy grow.



Greenhouse gases

Various gases in the earth's atmosphere trap heat, similar to how glass traps heat in a greenhouse. Many of these greenhouse gases occur naturally, but human activities can increase their levels:

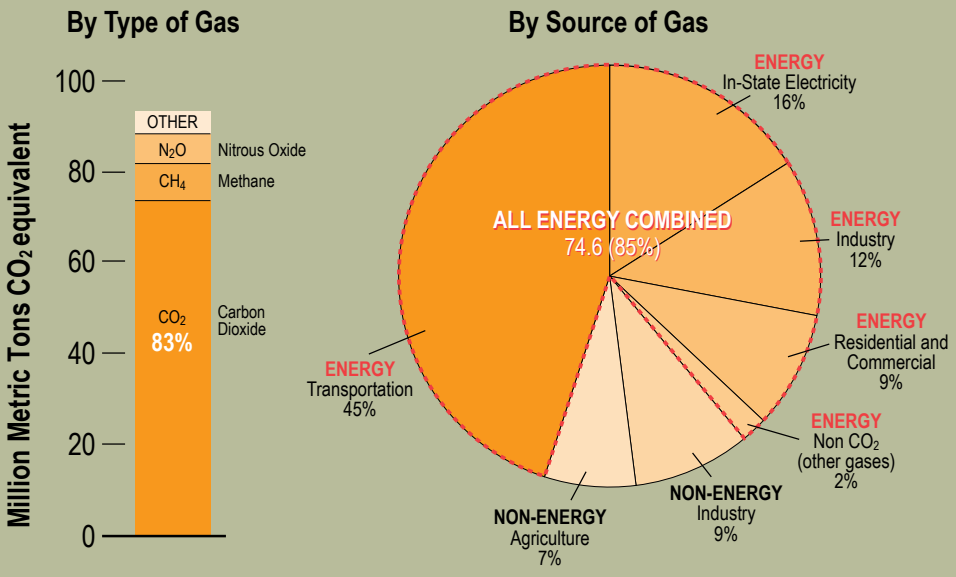
- Burning fossil fuels – oil, gasoline, gas, and coal – for energy
  - cars and trucks
  - planes, trains and ships
  - electrical power plants
- Industrial processes and mining
- Landfills, septic and sewer systems
- Agricultural practices, including fertilizer and manure management

> **"Prudence sometimes keeps us from acting precipitously. In this case, it requires us to act with urgency and seriousness."**
>
> – U.S. Conference of Catholic Bishops
> February 7, 2007, letter to Congress following release of the U.N. scientific report on climate change

Rising sea levels could have profound effects on existing infrastructure.

Greenhouse Gas Emissions in Washington State – 2004

TOTAL = 88.3 million metric tons of CO_2 equivalent



Source: Washington Department of Community, Trade and Economic Development (Preliminary Estimate)

> "Global warming puts both human health and the health of all of the rest of Earth's creatures at risk."
>
> – LeeAnne Beres, Executive Director, Earth Ministry, Seattle

Climate 101

Climate is the usual weather conditions that an area experiences over a long period of time. It includes patterns of temperature, precipitation, humidity, wind, and seasons. These patterns play a fundamental role in shaping ecosystems, economies and culture.

Some influences are obvious – sagebrush grows naturally in dry eastern Washington, but not on the rainy Olympic Peninsula. Other aspects are just as critical, such as the timing of rains or temperatures that affect when plants bloom and set fruit, when streams are their fullest, or when insects hatch.

Climate influences people, too. Where and how we live – our buildings, roads, utilities, recreation, clothing, crops and industries – all reflect and are affected by climate.

> "Warming of the climate system is unequivocal..."
>
> – Intergovernmental Panel on Climate Change, February 2007

Communities will need to consider how climate change will affect their transportation corridors, emergency response systems, building codes, and utilities. Photo courtesy City of Seattle.

Natural systems will change in response to rising temperatures. Photo courtesy National Park Service.

Feeling the effects of climate change

Climate is fundamental to Washington's economy, environment and communities, and the impacts of climate change are far reaching.

In Washington, water is a recurring theme in these impacts:

- Warmer temperatures are reducing the glacier ice and snow pack that we depend on for summer stream flows for forests, fish, agriculture, industries and cities.
- More rain will fall in winter, when less is needed, and less will fall in summer, when water needs are high.
- A rising sea level threatens communities along our 2,300 miles of Puget Sound and coastal shoreline.
- We can expect more extreme weather, more storms and more drought.

As the effects of climate change increase, it will no longer be business as usual in Washington– literally and figuratively.

Climate Economics

In 2006, in a study for the Washington State departments of Ecology and Community, Trade and Economic Development, a team of scientists and economists led by the University of Oregon concluded that the costs of climate change would grow as temperatures and sea level rise. These costs range from the expense of fighting wildfires and re-building shoreline structures to the economic impact of lost crops and tourism. For more information: http://www.ecy.wa.gov/climatechange/economic_impacts.htm.

Climate change also creates economic opportunities. Working to reduce greenhouse gases and prepare for inevitable changes opens the door to new markets:

- Transportation – more efficient vehicles and planes, fewer miles traveled using vehicles, switching modes of transportation.
- Biofuels – used for electricity and transportation.
- Renewable power – opportunities in wind, fuel cells and solar power.
- Energy efficiency – smart energy, solar hot water, appliance standards, etc.
- Carbon capture – particularly in soil and forests.

Expanding these industries can strengthen the state's economy and make it easier to adapt to the impacts of climate change.

Warmer temperatures

A few degrees warmer may not feel like much (may even feel good), but it can severely disrupt our environment, economy and communities. Milder winters with more rain and hotter summers with less rain will change the usual living conditions for plants and animals, including people.

- **Changing growing seasons –** a longer growing season for some plants. Any advantage may be offset by lack of water or hotter temperatures mid-season.
- **Pests in forests and crops –** pest populations can reproduce longer with less winter die-off. Drought-stressed forests are more vulnerable to infestation and fire.
- **Human health and disease –** respiratory conditions aggravated by smog and heat waves. Better growing conditions for some molds and diseases. Insect carriers of disease may move north into our area.
- **Native plant and animal population declines –** native species may not adapt quickly enough (or at all) to unusual conditions and habitat loss. Competing invasive species may expand their territory.

Warmer temperatures increase risk of forest fires. Photo courtesy Bureau of Land Management.

Reduced snow pack

Much of Washington's water supply falls as snow, where it is "stored" until warmer spring and summer weather allows it to melt. Warmer temperatures mean more precipitation will fall as rain instead of as snow, and the snow that does fall will melt earlier in spring.

- Receding glaciers – up to **75 percent of North Cascades glaciers could disappear by end of the century***.
- Lower summer stream flows – less snow pack to feed the streams and rivers in summer, less water available when needed for irrigation, hydropower, cities and salmon.
- Salmon declines – changed timing of stream flows, flooding and higher spring and summer stream temperatures impair salmon spawning, rearing and migration. Fewer returning salmon reduces nutrients to forests.
- Lower groundwater tables – less snow melting to recharge underground water supplies in summer. Some wells may go dry.

* Source: North Cascade Glacier Climate Project, Mauri S. Pelto.

Extreme weather

Weather systems are fed by energy (heat) in the atmosphere. Extreme weather events are expected to become more common as our climate heats up.

- **More extreme weather events** – wind storms, heat waves, droughts, heavy rain or snow, dust storms.
- **Droughts** – more frequent, with more impact on fish, cities, farms and forests, including increased forest fires.
- **Floods and landslides** – more extreme and more often.
- **Multiple emergency response needs** – potential to overtax the system, higher costs and longer response times.

Climate change is expected to mean more extreme weather, such as more frequent flooding and periods of drought.

> **"Climate change doesn't care what side of the mountains you live on."**
>
> – Spokane Mayor Dennis Hession

Rising sea level

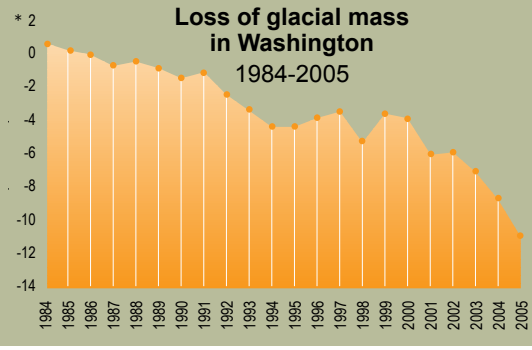
The Pew Center on Global Climate Change projects that a combination of factors (melting ice caps and warming oceans) could raise global sea level 1.6-4.5 feet by the end of this century. Coastal land would be flooded, and the shoreline and communities along it would be exposed to different dynamics.

- **Coastal flooding** – especially in low lying areas such as South Puget Sound, Willapa Bay, and the Skagit River Delta.
- **Coastal erosion and landslides** – more property damage from more frequent intense storms combined with higher sea levels.
- **Seawater intrusion in wells** – a problem especially for low-lying coastal and island communities.
- **Loss of wetlands and estuaries** – loss of habitat, flood storage, and other functions.

Rising sea levels will impact communities and individual property owners.

The South Cascade glacier in the Glacier Peak Wilderness has retreated more than three-quarters of a mile since its last major advance in the 1500s. About one third of that retreat has occurred since 1959. Overall, 53 glaciers have disappeared entirely from the North Cascades.

Source: North Cascade Glacier Climate Project, Nichols College, Dudley, Massachusetts



* Represents a glacial mass calculation that considers net mass and water equivalent.

Making a difference in how climate change changes Washington

Although our climate is changing, and we are seeing the effects, there are things we can do to address how climate change impacts Washington:

- We can work to reduce our contribution to global warming and climate change.
- We can get ready for the physical changes we can't prevent, so that they have less negative social and economic impact.

We need to approach the problem from both directions – reducing our contribution to climate change and preparing for the effects we cannot prevent. We need to work together – business, government, citizen groups, individuals, tribes, neighboring states and trading partners – to be effective and to get people involved.

In Washington, we've already taken steps toward reducing our green house gas emissions and toward addressing our water supply issues. We need to do more, but nearly 40 years of success working together to improve air and water quality in the state shows we can make a difference.

Washington is making investments in clean, renewable energy sources, such as solar and wind power. Photo of wind turbines courtesy Puget Sound Energy.

What the State is doing

Washington State is taking climate change seriously. In February 2007, Governor Gregoire signed an executive order establishing goals to:

- Reduce greenhouse gas emissions to 1990 levels by 2020 and to 50 percent below our 1990 levels by 2050,
- Grow the clean energy economy, nearly tripling the number of related jobs by 2020, and
- Move toward energy independence by reducing the amount we spend on imported fuel by 20 percent by 2020.

These goals build on actions Washington has already taken to cut emissions:

- Tougher emission standards (We adopted California Clean Car standards effective with the 2009 model year.)
- Renewable fuel standards
- High-performance "green" building standards
- Energy-efficient building codes
- Appliance efficiency standards
- An initiative for clean, renewable energy
- Energy conservation programs

Successfully implementing existing policies will provide 60 percent of the reductions needed to accomplish the emission reduction goals for 2020.

To fully meet the goals and to be sure we are ready to manage the inevitable impacts, the Governor also directed the departments of Ecology and Community Trade and Economic Development to lead state government in carrying out the Washington Climate Change Challenge. By early 2008, a broad cross-section of participants will develop recommendations for meeting the goals and for preparing the state, its communities and citizens for the effects of climate change that cannot be avoided.

Washington is working on regional and national solutions, too. For example, our governor and the leaders of five other states and two Canadian provinces ar working to set a regional target for reducing emissions. Participants include Oregon, California, Arizona, New Mexico, Utah, British Columbia, and Manitoba. Programs such as these create opoportunities, and the state wants Washington businesses to be well positioned to participate in them.

Washington State University is conducting research into conservation and renewable energy technology, such as more efficient methods for irrigation, and anaerobic digesters, that convert manure and other biosolids into fuel.
Photos courtesy Washington State University.

What you can do

As part of community efforts, at home, work and play, each of us can make a difference in how climate change changes Washington.

To reduce our individual contributions to the warming trend, we can reduce emissions of greenhouse gases. We can generate less heat and use energy more efficiently. We can trace the connections between the choices we make and the energy that is used. Some utility companies offer energy audits for their customers. Several organizations offer calculators for people to estimate the amount of greenhouse gases their activities create. Here's an example: http://www.greentagsusa.org/GreenTags/calculator_intro.cfm.

Compact Flourescent (CFL) Light Bulbs

CFL light bulbs use about 2/3 less energy than standard bulbs, and they last longer.

However, they contain mercury, a highly toxic metal. CFL bulbs must be disposed of properly, at a hazardous waste collection facility.

To find a collection site near you, call 1-800-RECYCLE

To prepare for the unavoidable effects of climate change, we can work now to reduce our future water and energy needs. We can get involved in local planning and climate change initiatives. We can share our ideas and look for more opportunities to make a difference.

Transportation accounts for 45 percent of Washington's contribution to greenhouse gas emissions. Alternate forms of transportation such as walking and riding bikes can reduce these emissions.

- **Drive less:** We can walk, bike, carpool, use public transportation, or telecommute. We can combine errands to reduce driving. We can save a pound of carbon dioxide (CO_2) for each mile of driving we eliminate.
- **Drive cleaner:** We can choose a fuel-efficient vehicle when we purchase or lease a car. We can consider an electric, a hybrid, or a car that uses a cleaner alternative fuel. We can get our cars or trucks tuned up to run as clean as possible.
- **Plant trees and other plants:** Trees absorb CO_2. As windbreaks, trees and shrubs can help cut heating costs. They also provide cooling shade.
- **Weatherproof our homes:** We can install energy efficient windows and storm windows. We can upgrade insulation in basements and attics. We can block heat leaks.
- **Choose green power:** We can purchase green power from our utility providers. We can consider an energy-efficient furnace, geothermal heat pump or solar rooftop panels for electricity and/or hot water. We can explore "passive" solar solutions, too.
- **Use less power:** We can use energy efficient light bulbs and turn off lights when leaving a room. We may be able to keep our homes a little cooler in the winter and warmer in the summer. We can turn our hot water heaters down to 120 degrees, insulate hot water tanks, and use less hot water. When buying appliances, we can choose the most energy efficient models. We can unplug devices (such as some TVs) that draw power even when they're off.
- **Use less water:** To prepare for water shortages, we can fix drips and leaks, we can take shorter showers and run the dishwasher or washing machine only with a full load. We can water our lawns less and use mulch and drip irrigation in our gardens.
- **Re-use, recycle and shop smart:** We can re-use items instead of discarding them. We can recycle what can't be used. We can buy recycled goods and goods with less packaging. Less energy went into them.

- **Get the community involved:** We can encourage our communities to act now. Metropolitan King County purchased 250 hybrid transit buses. The Port of Benton received a $50,000 grant to work with partners to study converting agricultural waste to energy. Mayors of 20 Washington cities have joined with Seattle's Mayor Nickels and nearly 400 mayors across the country, pledging to reduce greenhouse gas emissions in their communities.

Photo courtesy King County

The Bottom Line

To reduce the impacts of climate change in Washington:

- Use less energy.
- Use cleaner energy.
- Use water wisely.
- Get involved.
- Make the BIGGEST impact you can, as SOON as you can.

STATE OF WASHINGTON
DEPARTMENT OF COMMUNITY,
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http://www.ecy.wa.gov/climatechange

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