



Rhode Island  
Department of  
Environmental  
Management

OFFICE OF AIR RESOURCES

# Climate Change and Rhode Island

## Basics of Climate Change Science

### What is Climate Change?

Climate change refers to the anthropogenically-altered (human-caused) shifts in global climate patterns attributed to increased levels of greenhouse gases from burning fossil fuels. Particularly, climate change coincides with an increase in global surface temperatures over the last ~270 years (global warming).

### What's Causing Climate Change?

Emissions of greenhouse gases (GHG's) from the combustion of fossil fuels drives contemporary climate change. Carbon dioxide (CO<sub>2</sub>) is the chief GHG, followed by methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O).

### Hasn't Earth's Climate Always Changed?

Yes! Earth's climate has changed periodically since the dawn of time. The hot and humid Jurassic era, the cold and snowy Ice Age, and the relatively mild climate of the last 25,000 years resulted from natural shifts in climate.



### Weather vs. Climate

*Weather* is the daily atmospheric conditions that we all experience. One day it can be a cool rainy day, when the next is a hot sunny day.

*Climate* refers to daily weather averaged over very long time spans. Climate makes deserts hot, polar regions cold, and Rhode Island a temperate place to live.

### So What's the Difference Between Historical Shifts in Climate and What's Happening Today?

The difference between anthropogenic and natural climate change is the time scale on which these changes occur. Natural changes in climate occur over *thousands* of years, while recent shifts in climate patterns have occurred in the *last few hundred years*.

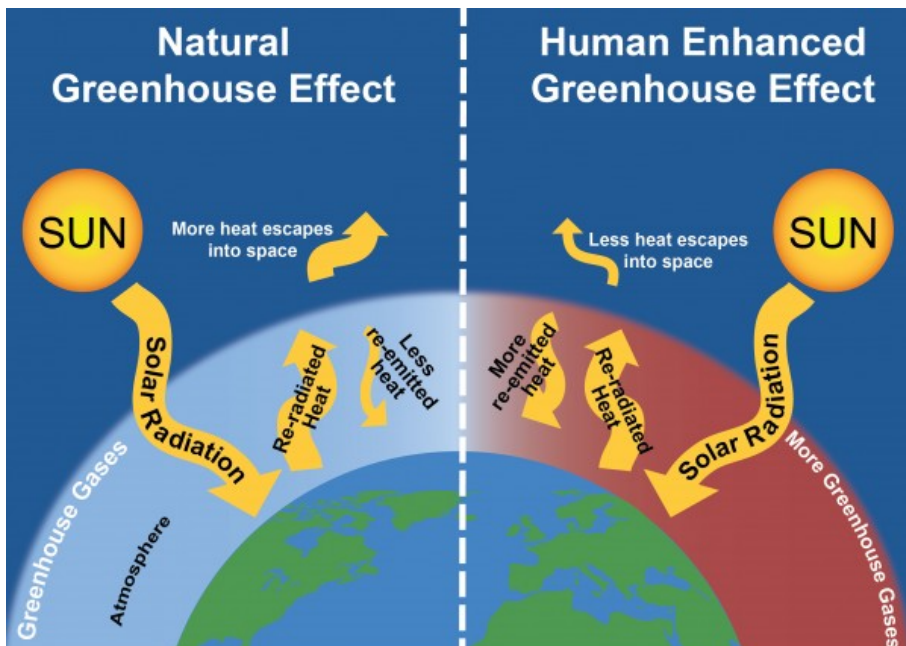
## It's Not Rocket Science

You may have heard of the greenhouse effect before. This natural phenomena, responsible for maintaining a habitable Earth, is the physical mechanism behind climate change. The Earth receives solar radiation from the Sun every day. This radiation, in the form of heat, is either absorbed, reflected, or re-emitted by the Earth's atmosphere.

However, as we burn fossil fuels in the form of coal, oil, and natural gas, the greenhouse effect becomes enhanced. This is why carbon dioxide, methane, and nitrous oxide are called 'greenhouse gases'. Their physical properties help trap heat in the Earth's atmosphere that would otherwise escape to space. As a result, the Earth's average temperature has risen 1.8 degrees Fahrenheit since pre-industrial times. (NASA)



Hurricane Damage in Florida



Courtesy of University of Michigan

## Consequences of a Warmer World

1.8 degrees Fahrenheit may not seem like a big increase in temperature, but remember we're talking about an *average*.

The shifts in natural climate patterns caused by a warmer Earth will be gargantuan. Droughts, floods, and more extreme weather will become commonplace by mid-century. Humanity can lessen the impacts of climate change through GHG mitigation and the adoption of clean energy resources.