

**UNDERSTANDING CLIMATE CHANGE**

# Animals in Danger



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# Extreme Weather and Rising Seas



Karina Hamalainen

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# The Greenhouse Effect

Mara Grunbaum

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# Facing a Warming World



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A worker stands on top of a wind turbine in Northern California.

In 2018, wind power supplied almost 14 percent of the electricity in the European Union, which covers most of Europe.

CHAPTER

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# The World Responds

Scientists say that to slow climate change, people around the world will have to make major changes. One big step in the right direction is to reduce greenhouse gas emissions. Many countries and businesses around the world have started to take action to slow climate change.

## Success Stories

China has invested heavily in solar technology. That country is now manufacturing and using affordable, efficient solar panels. In the United States, the cost of solar energy dropped by almost 90 percent from 2009 to 2018. The technology for harnessing the energy of the wind has also improved. It has also become a reliable, readily available energy source. Solar and wind power now cost about the same as power from fossil fuels.

## Slow to Change

Despite these success stories, governments and businesses have sometimes resisted adopting greener policies. There are many reasons for this. For example, raising gasoline taxes might convince people to use their cars less. But the raising of taxes could make some drivers angry. People in the oil and coal industries might worry that the decrease in driving will cause them to lose their jobs. As a result, politicians might be reluctant to promote green policies because that could keep people from voting for them.

### Timeline: Responses to Climate Change

**1938:**  
Scientists begin to understand how greenhouse gases affect climate.



**1988:**  
The Intergovernmental Panel on Climate Change is established.



**1997:**  
The Kyoto Protocol is adopted, setting targets for countries to reduce greenhouse gas emissions, effective in 2005.



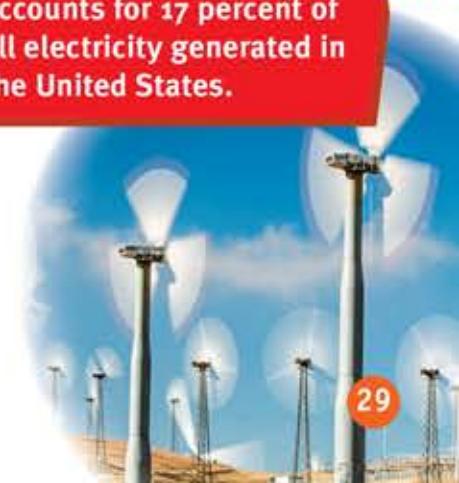
**2010:**  
The first plug-in electric cars made for a wide U.S. market are released.



**2015:**  
The Paris Agreement is adopted, prompting countries to create plans to limit greenhouse gases.



**2018:**  
Renewable energy accounts for 17 percent of all electricity generated in the United States.



The **BIG** Truth

# Engineering Earth

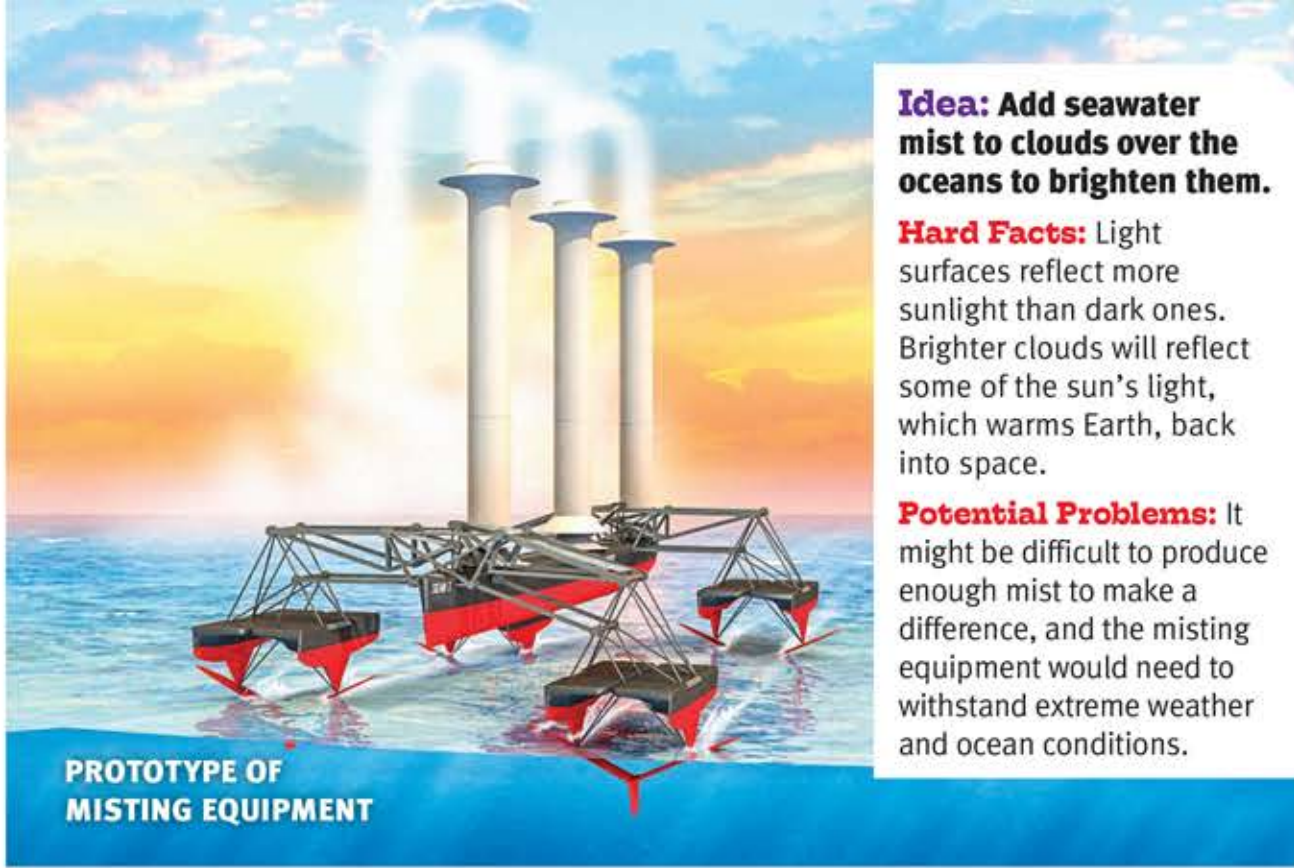
Most experts agree that the most efficient way to slow climate change is by reducing the use of fossil fuels. But researchers are also considering other options. Some scientists are researching how to combat climate change by changing Earth's climate systems. This is called geoengineering. Let's look at some examples.

PLANT IN HINWIL,  
SWITZERLAND

**Idea:** Build machines to suck carbon dioxide from the atmosphere.

**Hard Facts:** A large facility built in Switzerland effectively removes carbon from the air.

**Potential Problems:** It would take 250,000 of these facilities to remove just 1 percent of the world's global carbon dioxide emissions from the air. Carbon-sucking machines require energy, often from burning fossil fuels, to run.



PROTOTYPE OF  
MISTING EQUIPMENT

**Idea:** Add seawater mist to clouds over the oceans to brighten them.

**Hard Facts:** Light surfaces reflect more sunlight than dark ones. Brighter clouds will reflect some of the sun's light, which warms Earth, back into space.

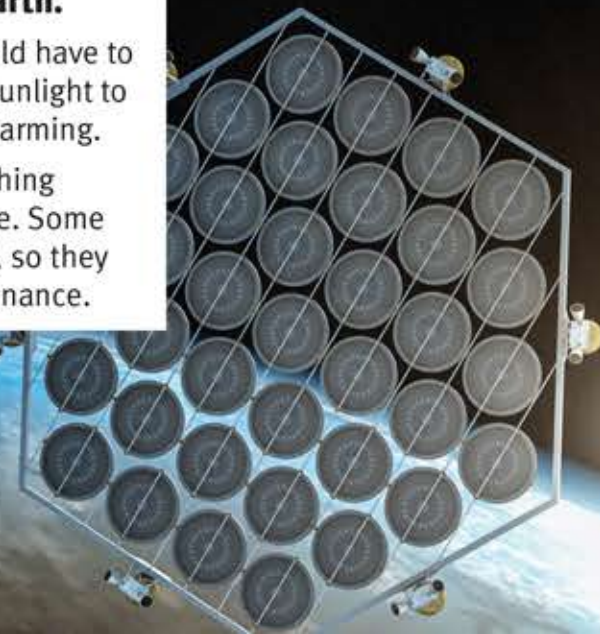
**Potential Problems:** It might be difficult to produce enough mist to make a difference, and the misting equipment would need to withstand extreme weather and ocean conditions.

**Idea:** Send millions of small mirrors into orbit around Earth.

**Hard Facts:** The mirrors would have to block only a small amount of sunlight to have a large effect on global warming.

**Potential Problems:** Launching the mirrors would be expensive. Some mirrors would not stay in orbit, so they would require constant maintenance.

PROTOTYPE OF  
ORBITAL SOLAR FARM



# Leading the Way

In 2018, Greta Thunberg, a 15-year-old girl from Stockholm, Sweden, was growing frustrated with her government's lack of action on climate change. To bring attention to the problem, she began a school strike for climate in her home city. Each Friday, instead of going to school, she protested in front of government buildings.



Greta Thunberg has inspired millions of people around the world, including these in Australia, to join her Fridays for Future strikes.

## MAKING CHANGE

Greta Thunberg has become the face of the movement to force politicians to act on climate change.

Over time, that attention arrived.

Many people posted pictures of Thunberg on social media, and reporters interviewed her. Thunberg's message about the need to act spread. She became famous worldwide.

Thunberg's strikes and her message inspired millions of students in other countries to strike. More than seven million people took part in a global climate strike in September 2019.

Thunberg also drew the attention of politicians. She gave speeches at the European Parliament and at the United Nations Climate Action Summit. She accused adults of stealing the future from young people by not dealing with climate change. Many politicians became aware of the implications of climate change because of the actions of Thunberg and other young people.

