

WELCOME
TO
THE ATMOSPHERIC
SCIENCES DIVISION

The logo for Brookhaven National Laboratory features a stylized grey swoosh that curves around a small red dot, resembling an orbit or a particle path. Below this graphic, the text "BROOKHAVEN" is written in a bold, black, sans-serif font, and "NATIONAL LABORATORY" is written in a smaller, black, sans-serif font below it.

BROOKHAVEN
NATIONAL LABORATORY

2001 OPEN HOUSE

On August 26, 2001 the Atmospheric Sciences Division played host to an open house as part of the BNL Summer Sunday program.

This document includes many of the posters that were prepared for this open house.

If you visited us on that day, we hope that this serves as a reminder of what you saw.

If not, we hope it will serve as a virtual visit. Enjoy your tour.

Atmospheric Sciences Division

BROOKHAVEN
NATIONAL LABORATORY

PRINCIPAL RESEARCH AREAS

- Formation of ozone and other oxidants
- Chemical and microphysical properties of atmospheric aerosols
- Influence of atmospheric aerosols on the earth radiation budget in the context of global climate change
- Atmospheric transport and other applications of tracer compounds

Atmospheric Sciences Division

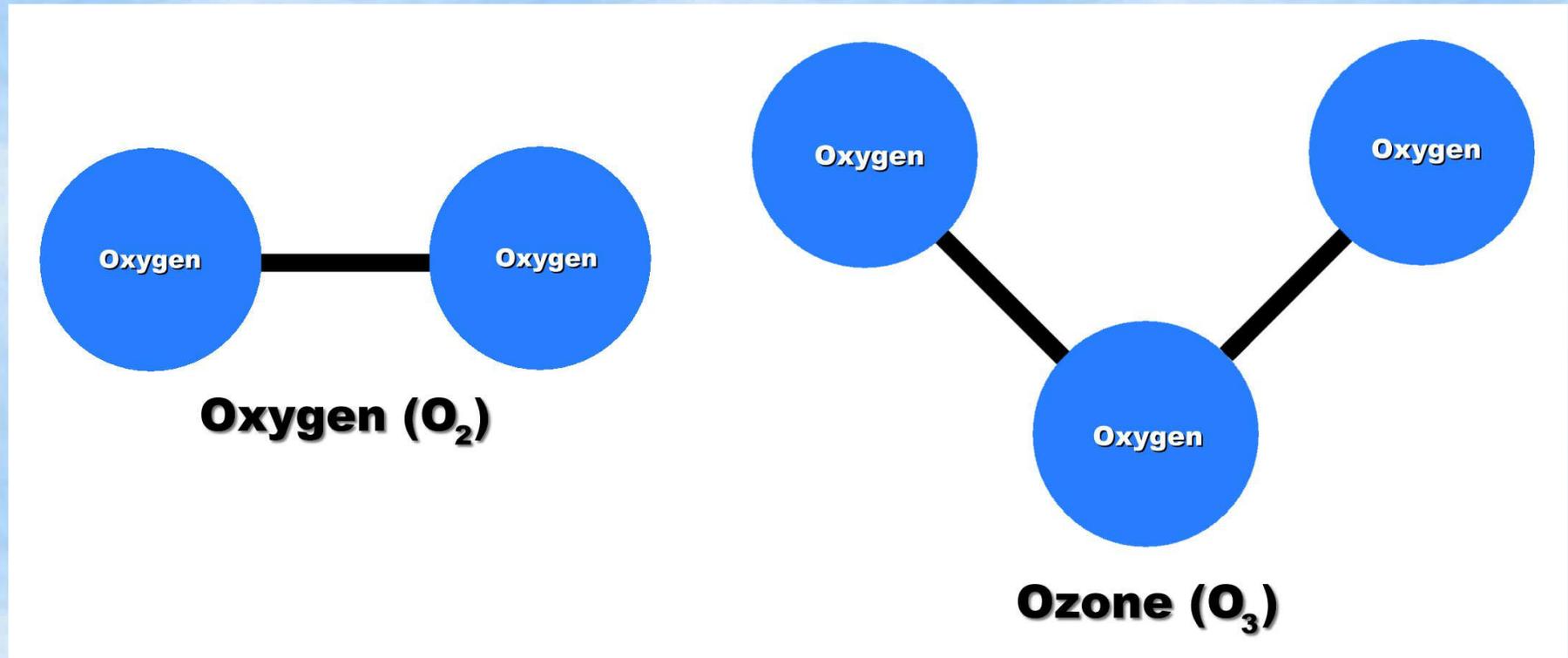
BROOKHAVEN
NATIONAL LABORATORY

BNL SCIENTISTS ON THE MOVE



BNL atmospheric scientists participate in field projects throughout the country.

OZONE: A REACTIVE FORM OF OXYGEN



Ozone is a reactive form of oxygen that contains three atoms instead of the normal two.

YOUR CONTRIBUTION TO OZONE FORMATION

NEW YORK STATE INSPECTION RECEIPT

MOTORIST COPY

1995 FORD XFX147 07/07/02 \$35.00
Year Make Plate No Exp. Date Fee

82402 7063488 51X2 ON
Mileage Station Insp. No Line Found

Emissions	HC	CO	NOx
Test Limits	1.20	20.0	3.00

Emissions	HC	CO	NOx
Test Results	0.08	1.2	0.32

Certificate No. 20150966 EIR No. 1-1192

KEEP THIS RECEIPT FOR YOUR RECORDS

VS-1082E (6/98)

Ozone precursor emissions, grams per mile

NEW YORK STATE SUES MIDWEST STATES OVER OZONE

Possible Federal Pullout Clouds Northeast States' Pollution Suits

The New York Times August 20, 2001
ON THE WEB

By RICHARD PÉREZ-PEÑA

As the Bush administration considers withdrawing from air pollution lawsuits against power plants in the Midwest and South, people on both sides of the dispute say the Northeast states that have also sued will be hard-pressed to pursue the cases on their own.

“We will pursue these cases no matter what happens in Washington,” said Eliot L. Spitzer, the New York State attorney general, “but losing out on the participation and resources of E.P.A. and the Justice Department would be a substantial loss and would make our job much harder, no question.”

In the Northeast, so much of the pollution arrives on the prevailing winds from the West and South that if New York City and some other areas were to stop all local emissions, they would still violate federal clean air standards. After two decades of steady improvement, the region's air quality leveled off and has even worsened a bit, abetted by hot summers two of the last three years. So far this year, monitoring stations around New York State have recorded 168 ozone readings that violate federal standards, the second-highest figure for any year in the last decade, and a sharp increase from 60 in all of last year.

New York state is downwind of major midwestern sources.

WHAT IS AN *AEROSOL*?

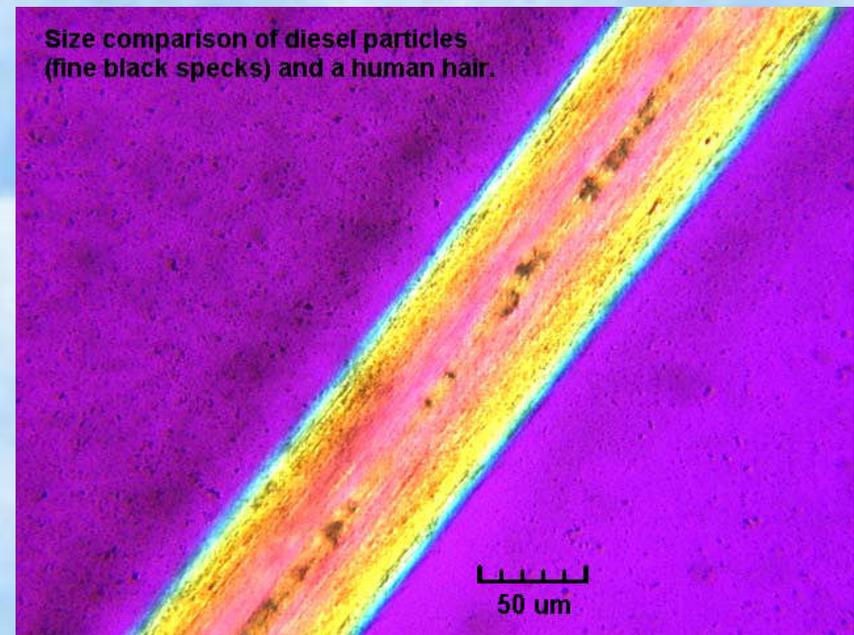
An aerosol is a suspension of small particles in air.

Examples are smoke, dust, haze and clouds.

Many aerosols are produced by fossil fuel combustion.

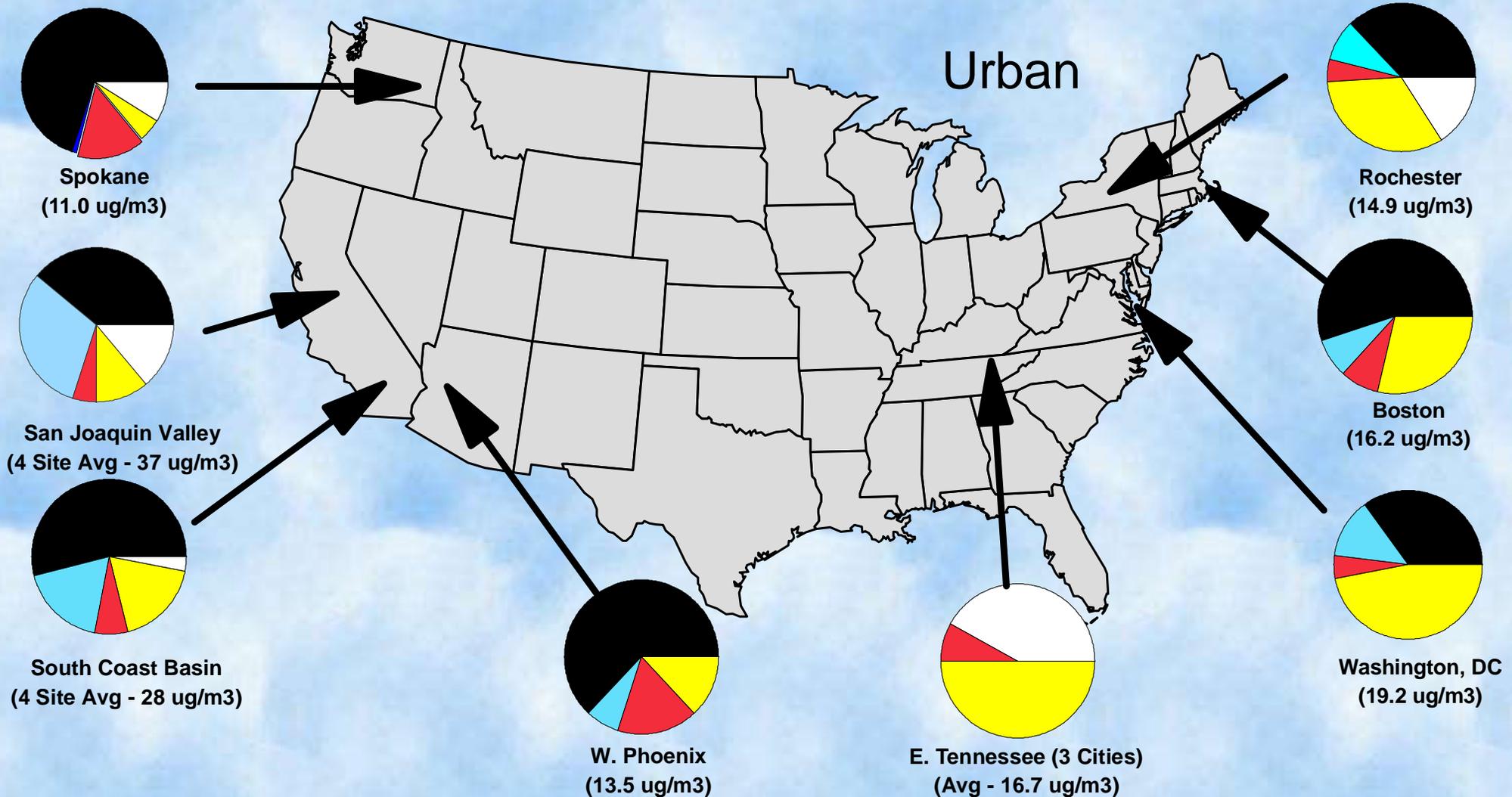
Aerosols affect human health and welfare and influence climate change.

This electron micrograph shows small soot aerosol particles next to a human hair.



Source: M. Kleinman

NOT ALL AEROSOLS ARE THE SAME



What are the major aerosol species in the Eastern United States?

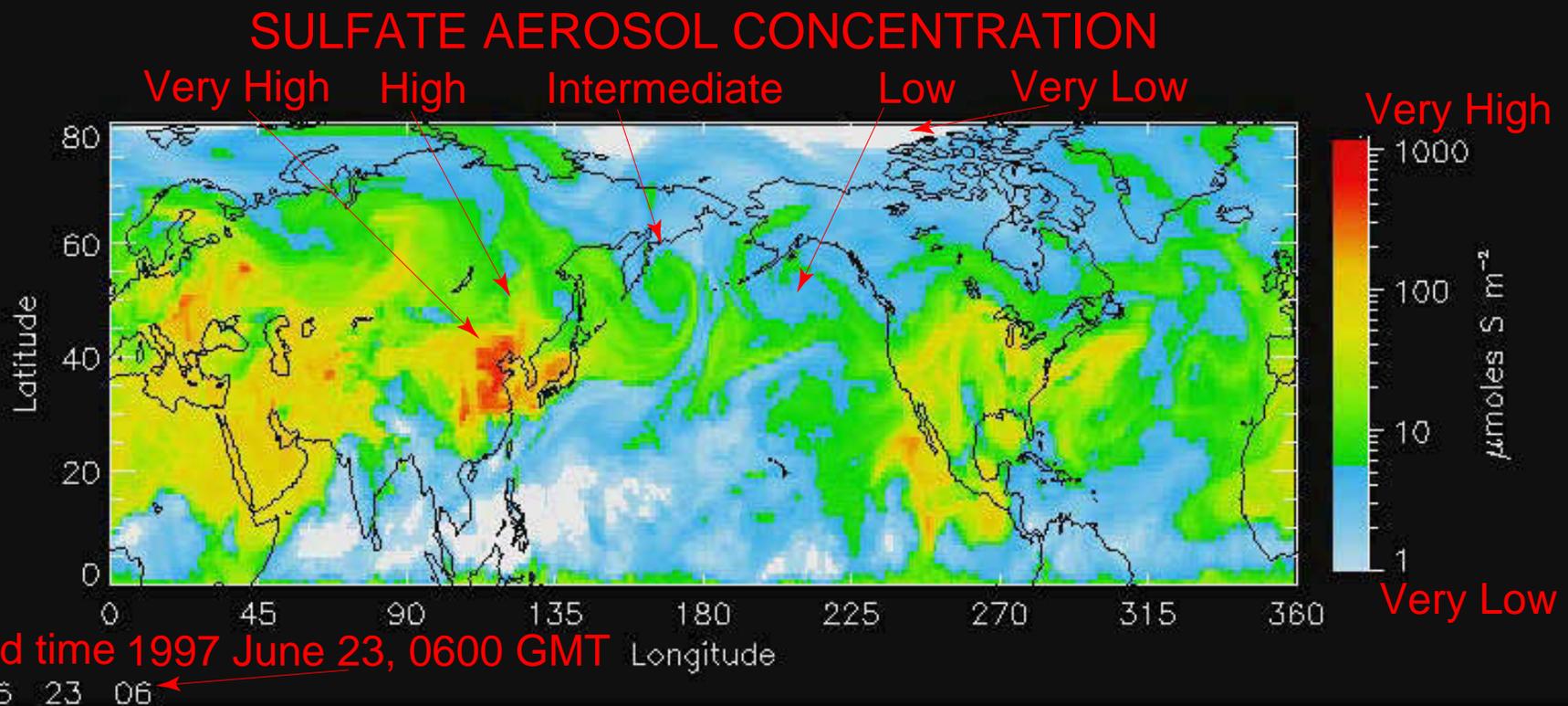
REMARKS BY THE PRESIDENT ON GLOBAL CLIMATE CHANGE

June 11, 2001

- “ Our useful efforts to reduce sulfur emissions may have actually increased warming, because *sulfate particles* reflect sunlight, bouncing it back into space.”
- “ Kyoto also failed to address two major pollutants that have an impact on warming: *black soot* and tropospheric ozone. Both are proven health hazards. Reducing both would not only address climate change, but also dramatically improve people's health.”

DISTRIBUTION OF SULFATE AEROSOL IN THE NORTHERN HEMISPHERE IN JUNE - JULY 1997

Animations of Sulfate Column Concentration
Obtained with
BNL Chemical Transport Model



YELLOW SEA MEASUREMENT STATION



BNL scientists measured aerosol properties at Cheju Island off the tip of South Korea during the ACE-Asia campaign, spring 2001.

BNL ATMOSPHERIC CHEMICAL LIDAR SYSTEM

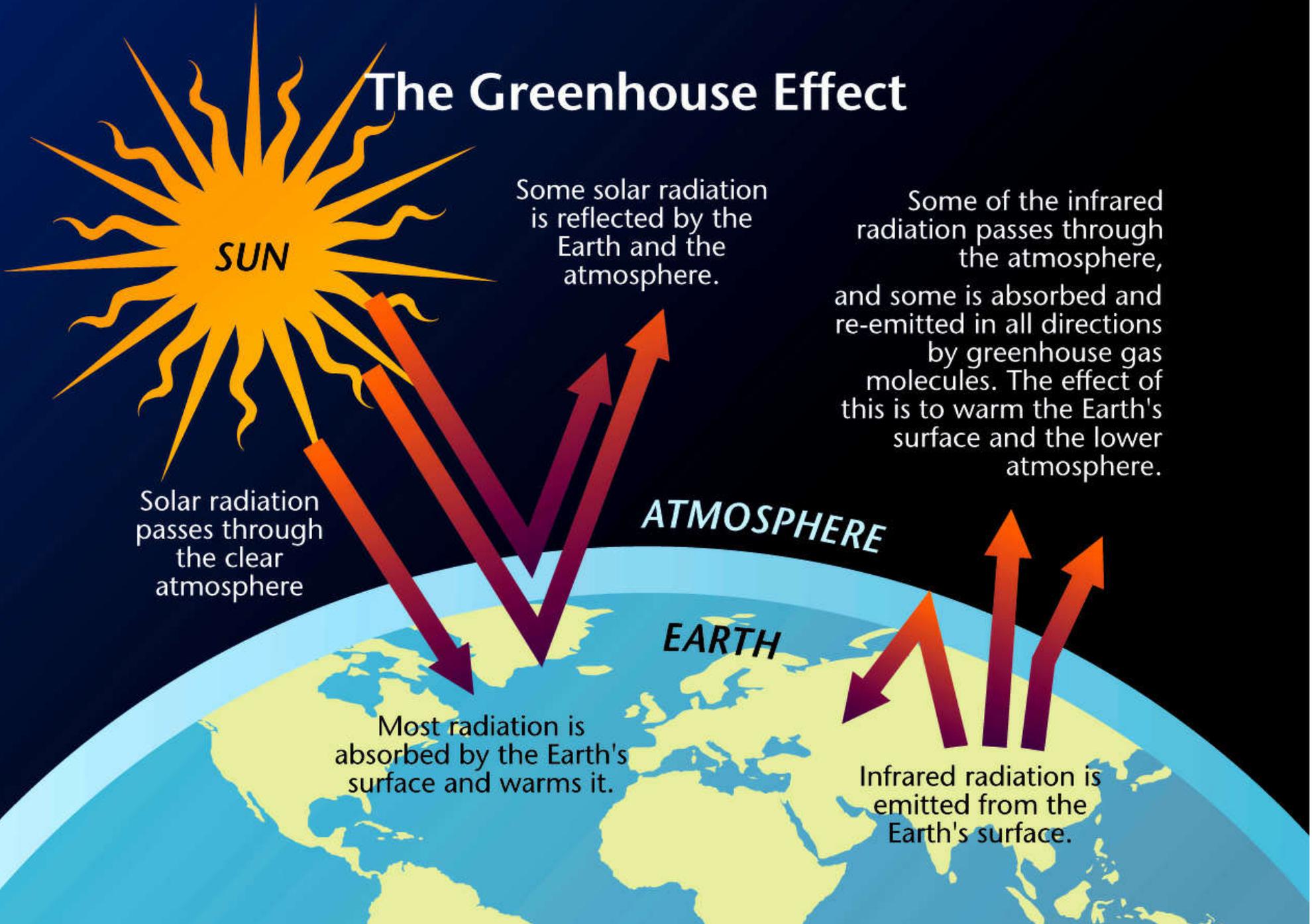
BNL has constructed and operates a mobile LIDAR (Light Detection and Ranging) system in an instrumented van.

It can detect and identify particles and gases at ranges up to about 3 km (2 miles) using ultraviolet laser light, operating on a principle similar to RADAR.

The light is sent horizontally. A fraction is back-scattered to a 16-inch receiver telescope.

The distance is calculated from the time delay of the return and the speed of light. The chemical identity is determined by the wavelength of the scattered light.

The Greenhouse Effect



SUN

Some solar radiation is reflected by the Earth and the atmosphere.

Some of the infrared radiation passes through the atmosphere, and some is absorbed and re-emitted in all directions by greenhouse gas molecules. The effect of this is to warm the Earth's surface and the lower atmosphere.

Solar radiation passes through the clear atmosphere

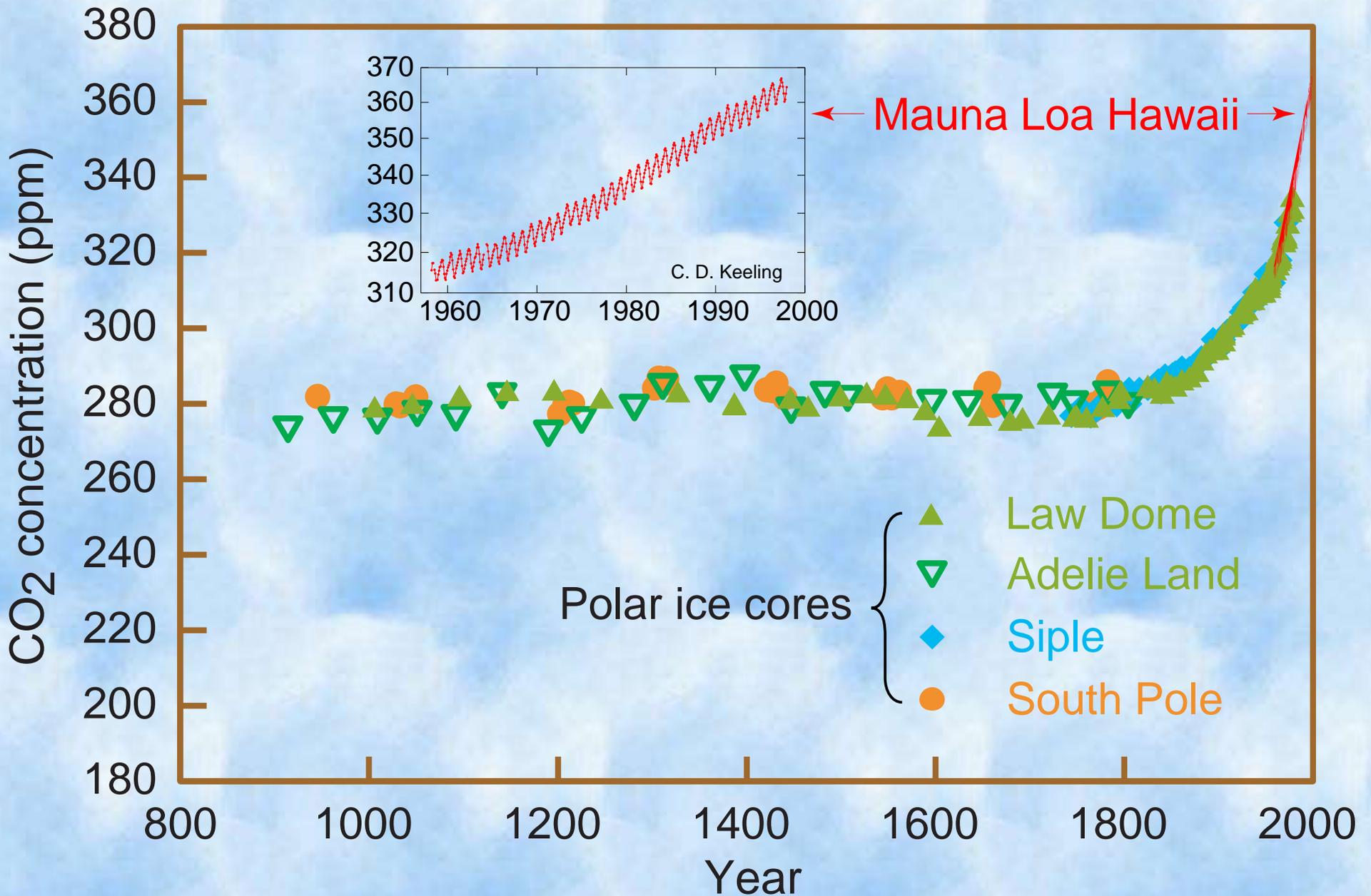
ATMOSPHERE

EARTH

Most radiation is absorbed by the Earth's surface and warms it.

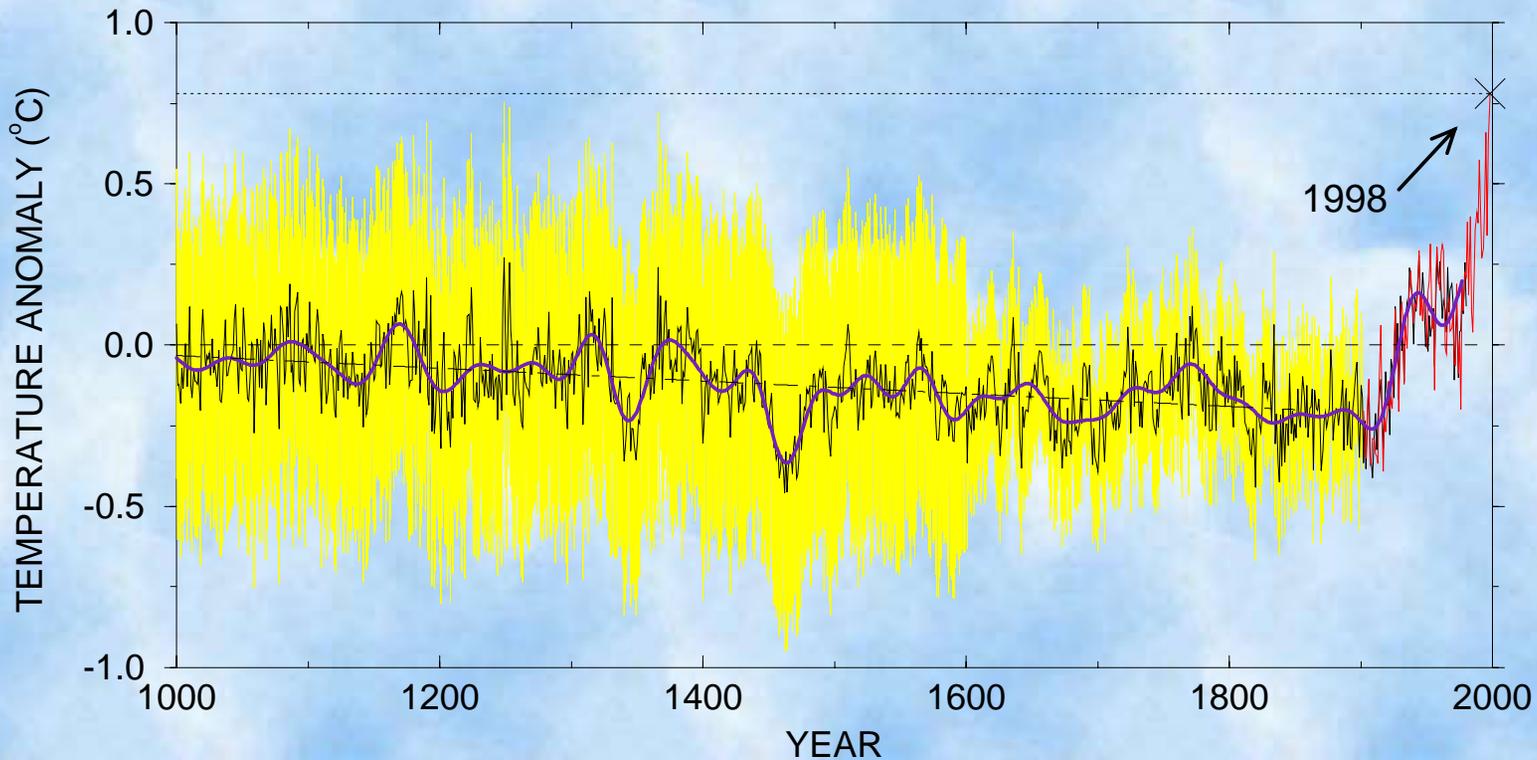
Infrared radiation is emitted from the Earth's surface.

ATMOSPHERIC CARBON DIOXIDE IS INCREASING



Global carbon dioxide concentration over the last thousand years

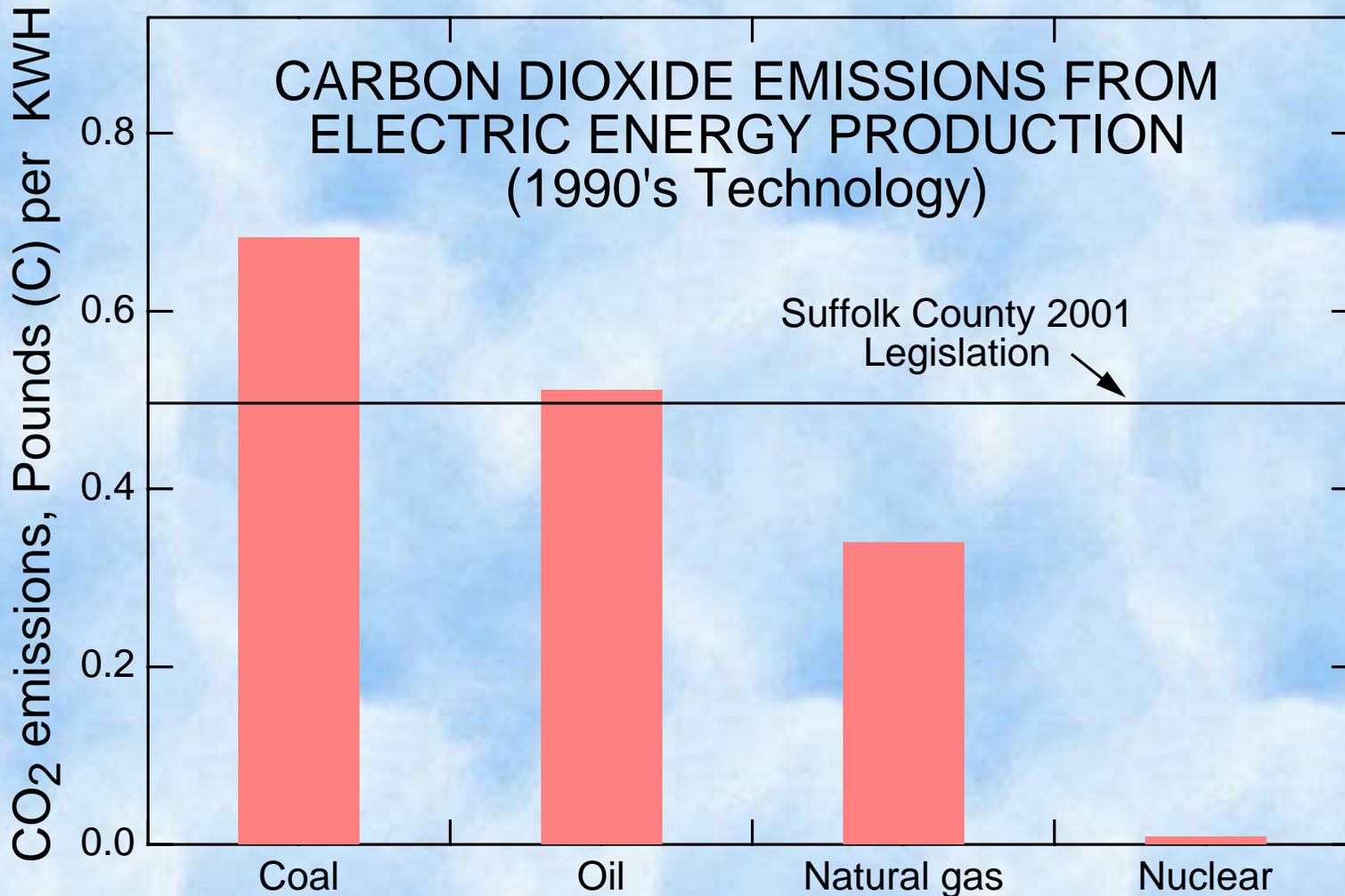
THE TEMPERATURE'S RISING



- Reconstruction (AD 1000-1980)
- Instrumental data (AD 1902-1998)
- - - Calibration period (AD 1902-1980) mean
- Reconstruction (40 year smoothed)
- - - Linear trend (AD 1000-1850)

Northern Hemisphere temperature trend (1000-1998), from tree-ring, coral, and ice-core proxy records As calibrated by instrumental measurements. *Mann et al., Geophysical Research Letters, 1999*

YOUR FAMILY'S CONTRIBUTION TO THE GREENHOUSE EFFECT



A typical household using 1000 kilowatt hours of electricity per month is responsible for emission of 3 tons of carbon a year in the form of carbon dioxide.

How much does your household contribute?

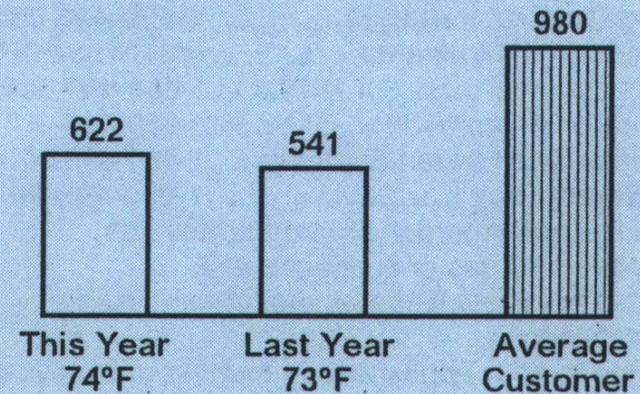
YOUR CONTRIBUTION TO THE GREENHOUSE EFFECT

ELECTRIC SUPPLY AND DELIVERY FROM LIPA

Meter Readings Meter # 15790134

Jul 24	93155	Actual
Jun 26	92533	Actual
<hr/>		
Use	28 Days	622 KWH

Comparisons KWH



Cost Rate 880 - Water and Home Heating

Basic Service: 28 Days @ 17.90¢	\$5.01
Use: 233 KWH @ 12.49¢	29.10
140 KWH @ 13.67¢	19.14
249 KWH @ 9.78¢	24.35
Excess Fuel Price Surcharge	4.28
PILOTs and Credits	1.40
Shoreham Credit	-.59
Sales Tax: @ 1%	.83
Total	\$83.52



Jul 25, 2001

Date

927 20 1805 3 5

Account Number

1-800-490-0025

Any Questions?

See Back Of Bill

Service Problems

At half a pound of carbon per KWH, the average household is responsible for emission of 500 pounds of carbon a month .

Suffolk County Limits CO₂ Emissions

Breath of Fresh Air

Gaffney signs bill to limit greenhouse gas emissions

Newsday July 25, 2001

By Emi Endo

Suffolk County Executive Robert Gaffney yesterday signed into law a bill aimed at limiting greenhouse gas emissions locally, although critics questioned how much it would actually reduce the emissions.

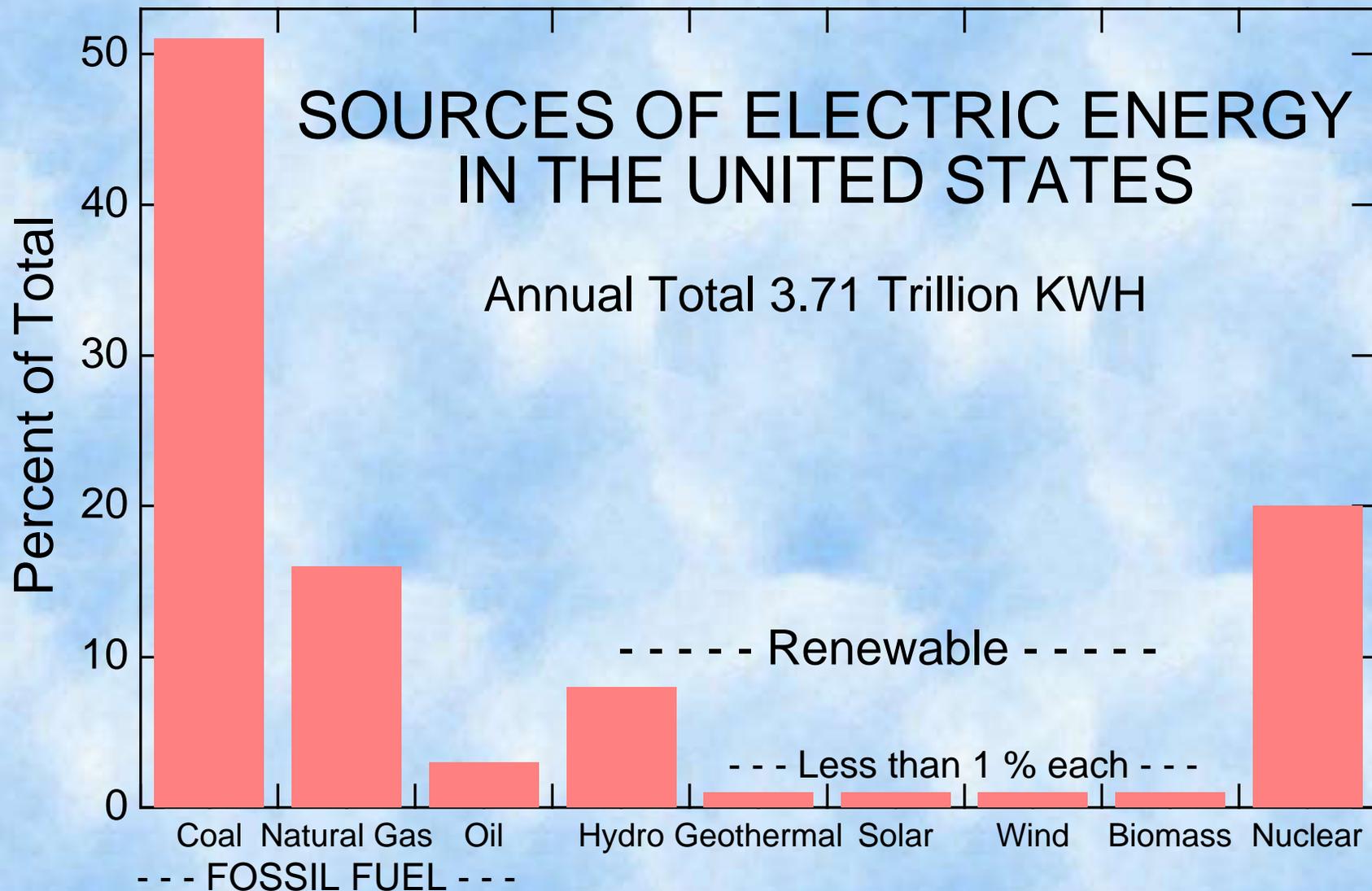
Beginning in March, for every 100 megawatts of new generation added in the county, the emissions rate must be reduced by 1 percent,

until a 20-percent reduction is achieved. Power plants that exceed the standard would face fines.

During negotiations, Fisher raised the emissions limit from less than 1,500 pounds to 1,800 pounds of carbon dioxide per megawatt hour and cut the penalties from \$5 for each ton of carbon dioxide emissions exceeding the limit to \$2.

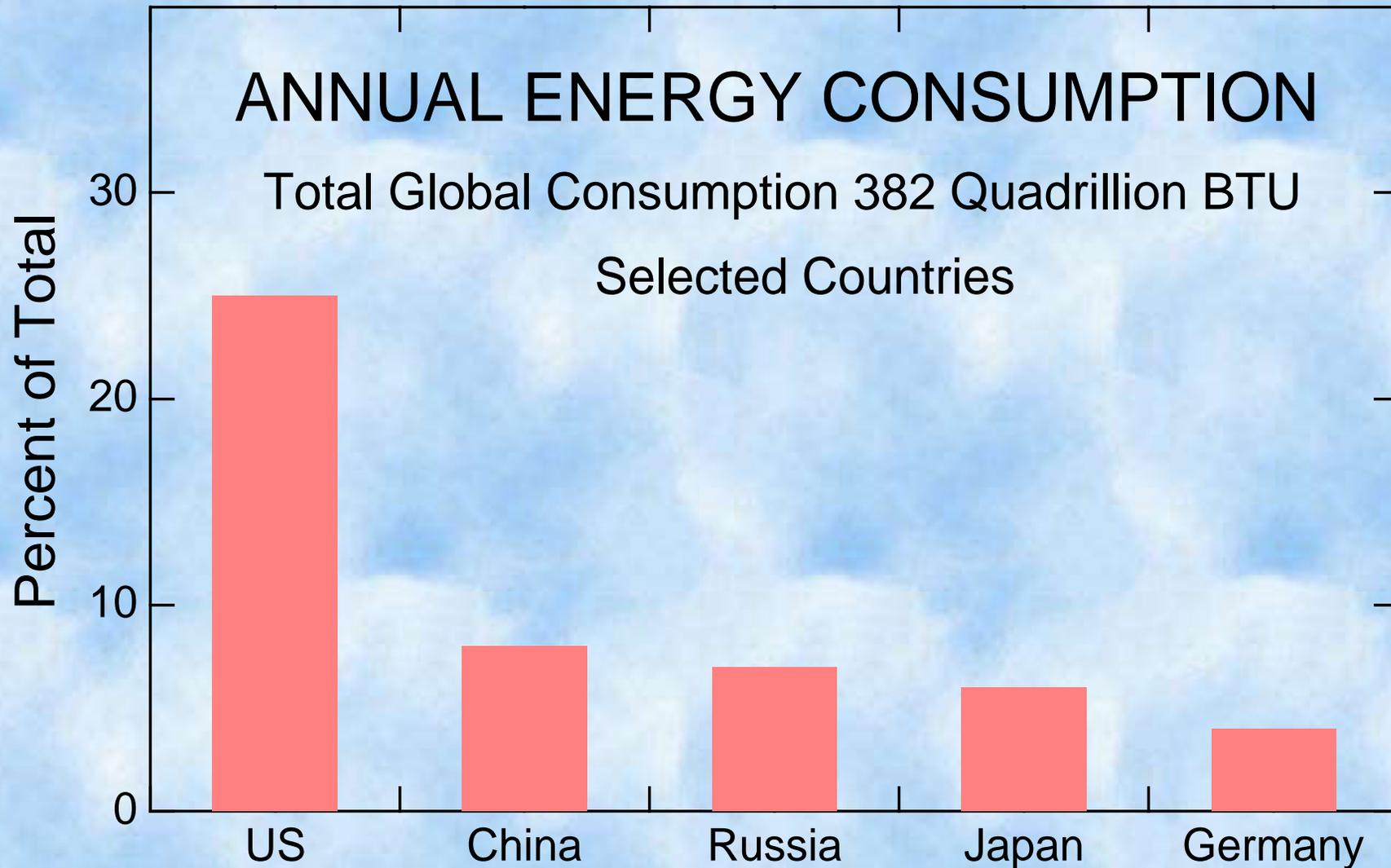
0.49 lbs Carbon per KWH

WHERE DOES YOUR ELECTRIC ENERGY COME FROM?



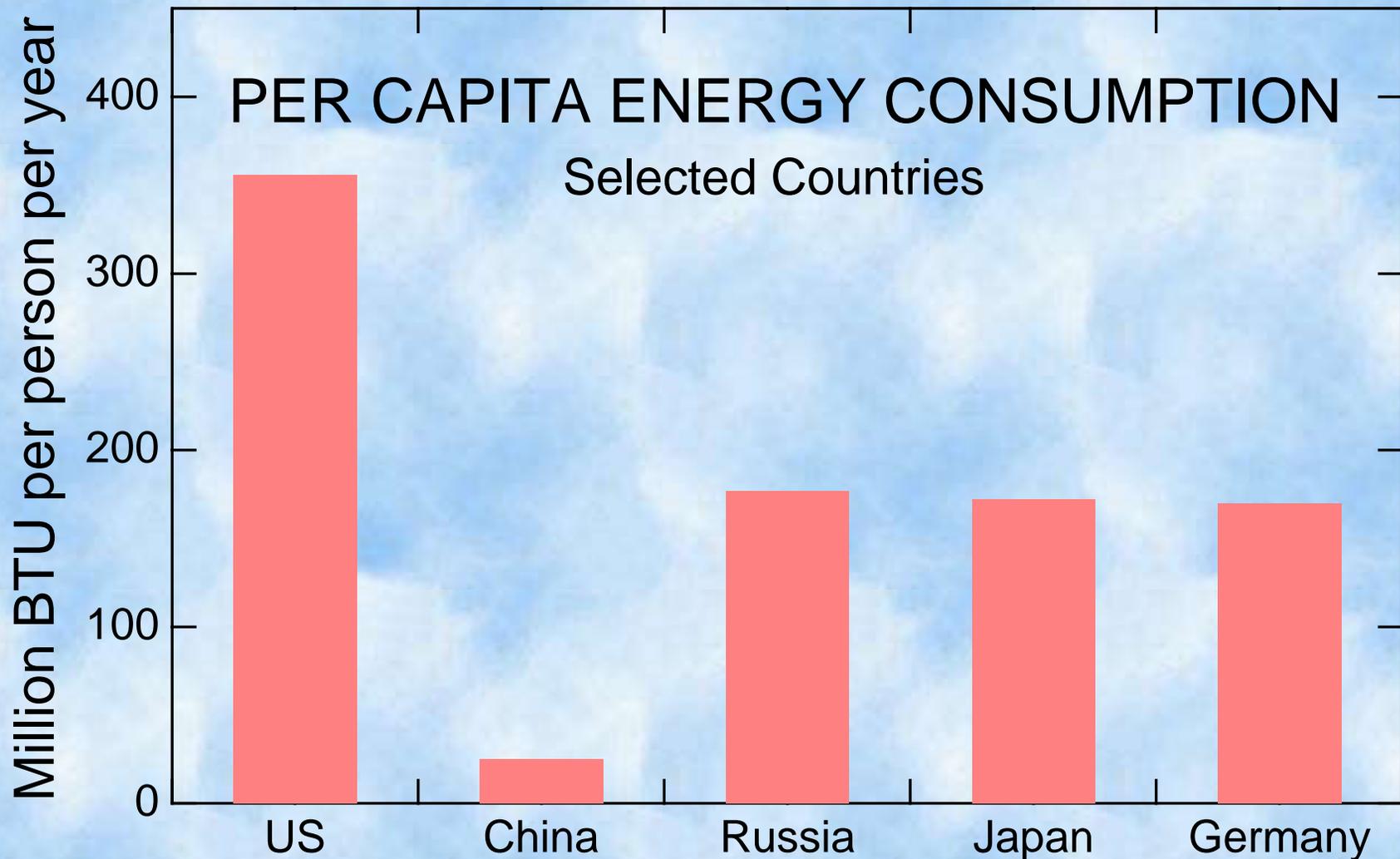
On Long Island most electric energy derives from combustion of oil.

WHAT COUNTRY USES THE MOST ELECTRIC POWER?



No surprise. It's the United States.

WHAT COUNTRY USES THE MOST ELECTRIC POWER *PER CAPITA*?



No surprise. It's the United States again.



HOW MUCH CARBON IS IN A GALLON OF GASOLINE?



1 lb?



2 lbs?



3 lbs!?

5 lbs!?!?

All of this carbon goes into the atmosphere as carbon dioxide when you burn the gasoline in your car.



THE MOST EFFECTIVE WAY TO
DOUBLE THE FUEL ECONOMY
OF A CAR . . .

IS TO PUT TWO PEOPLE IN IT!

THANK YOU

For Visiting

**THE ATMOSPHERIC
SCIENCES DIVISION**

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