



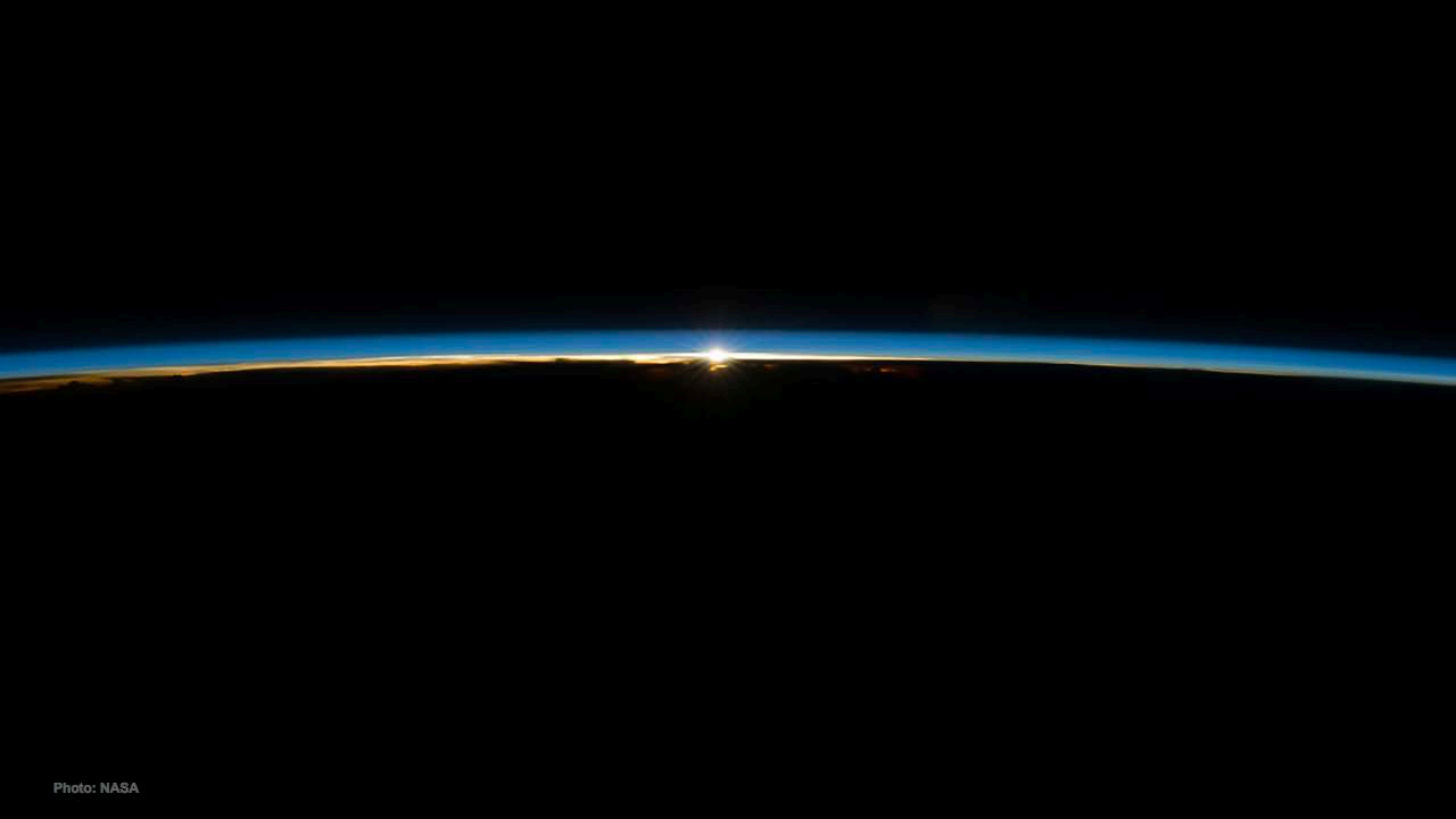


**1. Must we change?**

**2. Can we change?**

**3. Will we change?**

**1. Must we change?**



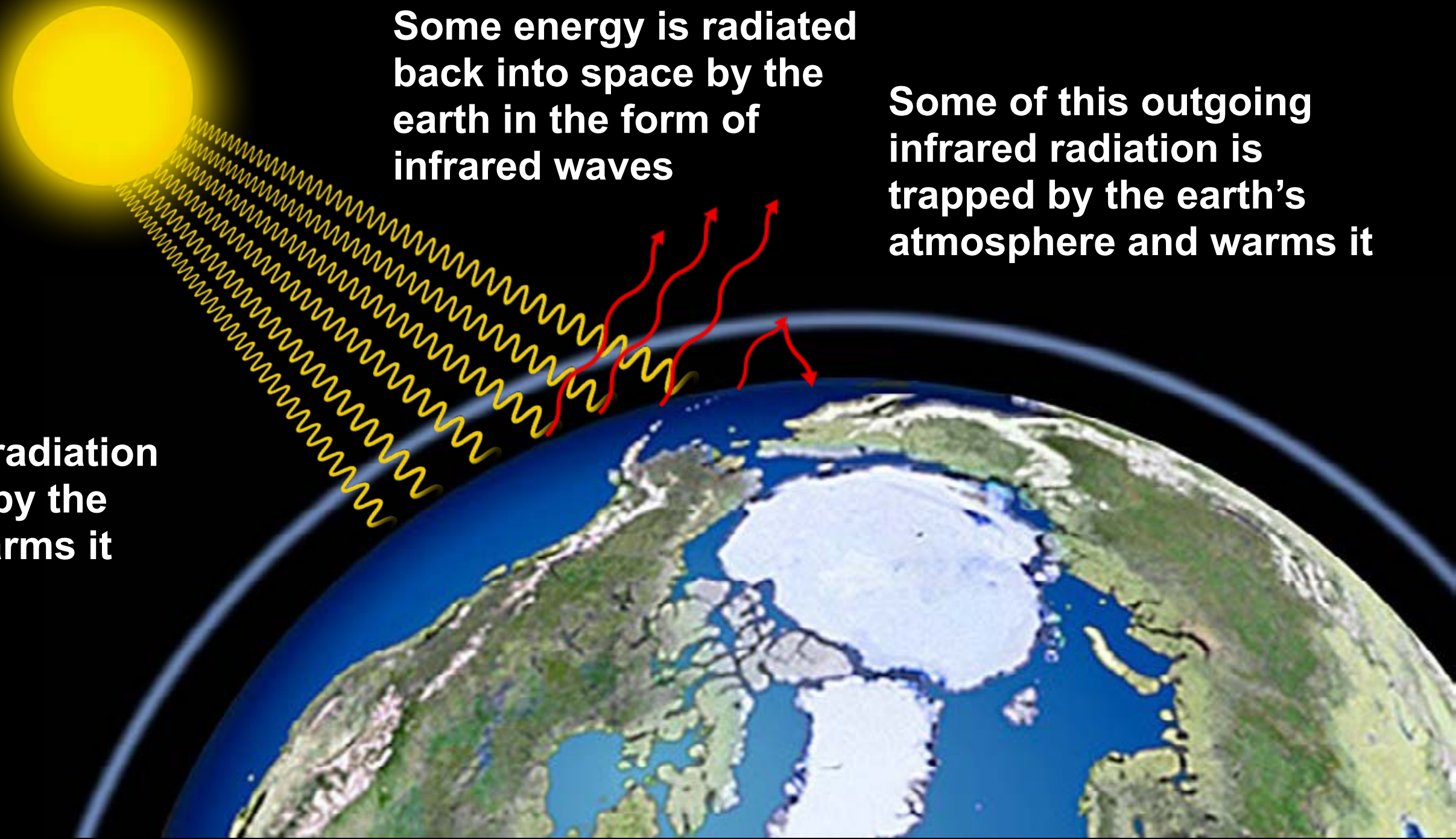
**We are Dumping 110 Million Tons of Manmade Global Warming Pollution into the Atmosphere every 24 Hours**

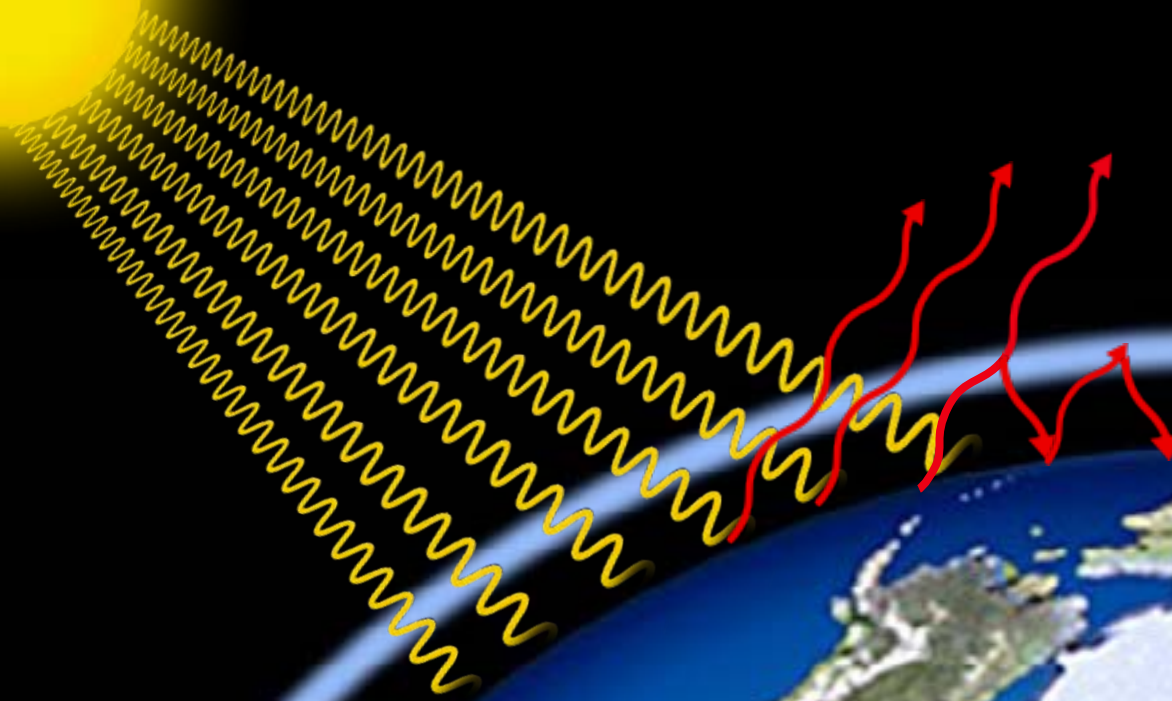
**Solar radiation  
in the form of lightwaves  
passes through the  
atmosphere**

**Most of this radiation  
is absorbed by the  
Earth and warms it**

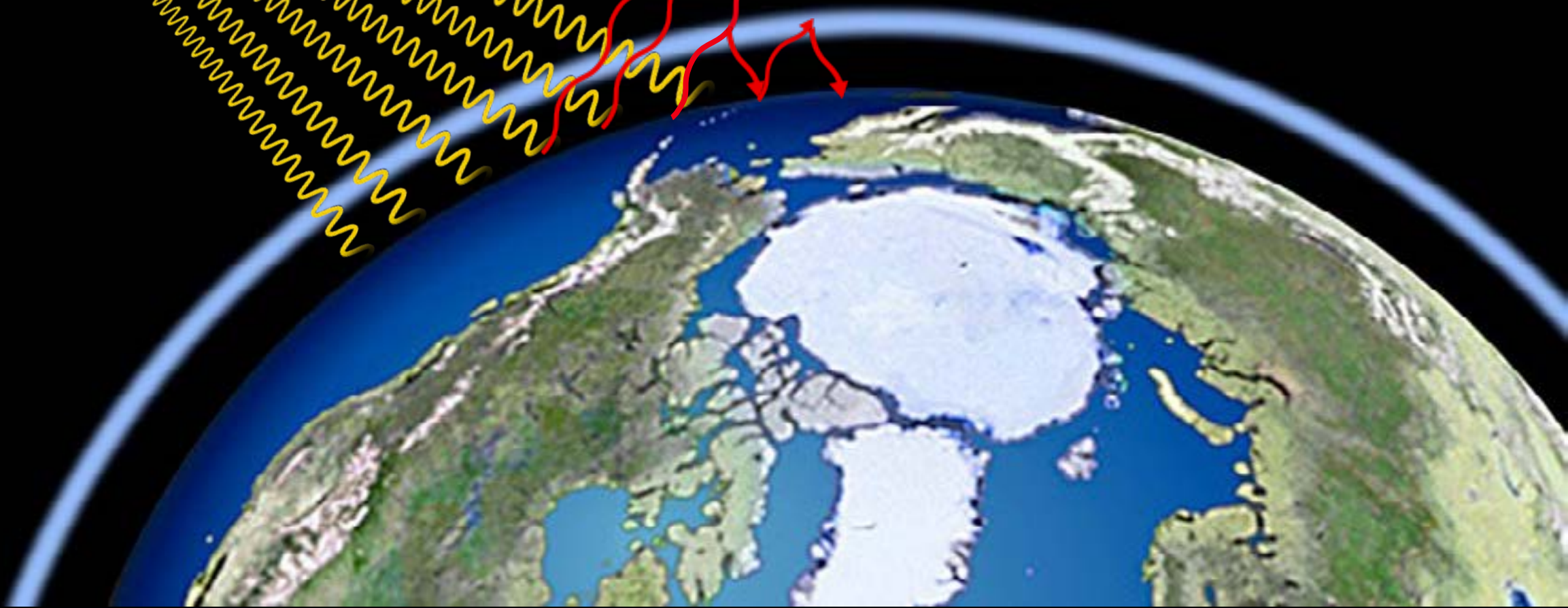
**Some energy is radiated  
back into space by the  
earth in the form of  
infrared waves**

**Some of this outgoing  
infrared radiation is  
trapped by the earth's  
atmosphere and warms it**





**As the CO<sub>2</sub> concentration increases, more of the outgoing infrared radiation is trapped.**





# THE BIGGEST SOURCES OF GREENHOUSE GASES



THAWING PERMAFROST

COAL MINING

COAL PLANTS

CROP BURNING

FERTILIZATION

FOREST BURNING

AIR TRANSPORT

OIL PRODUCTION

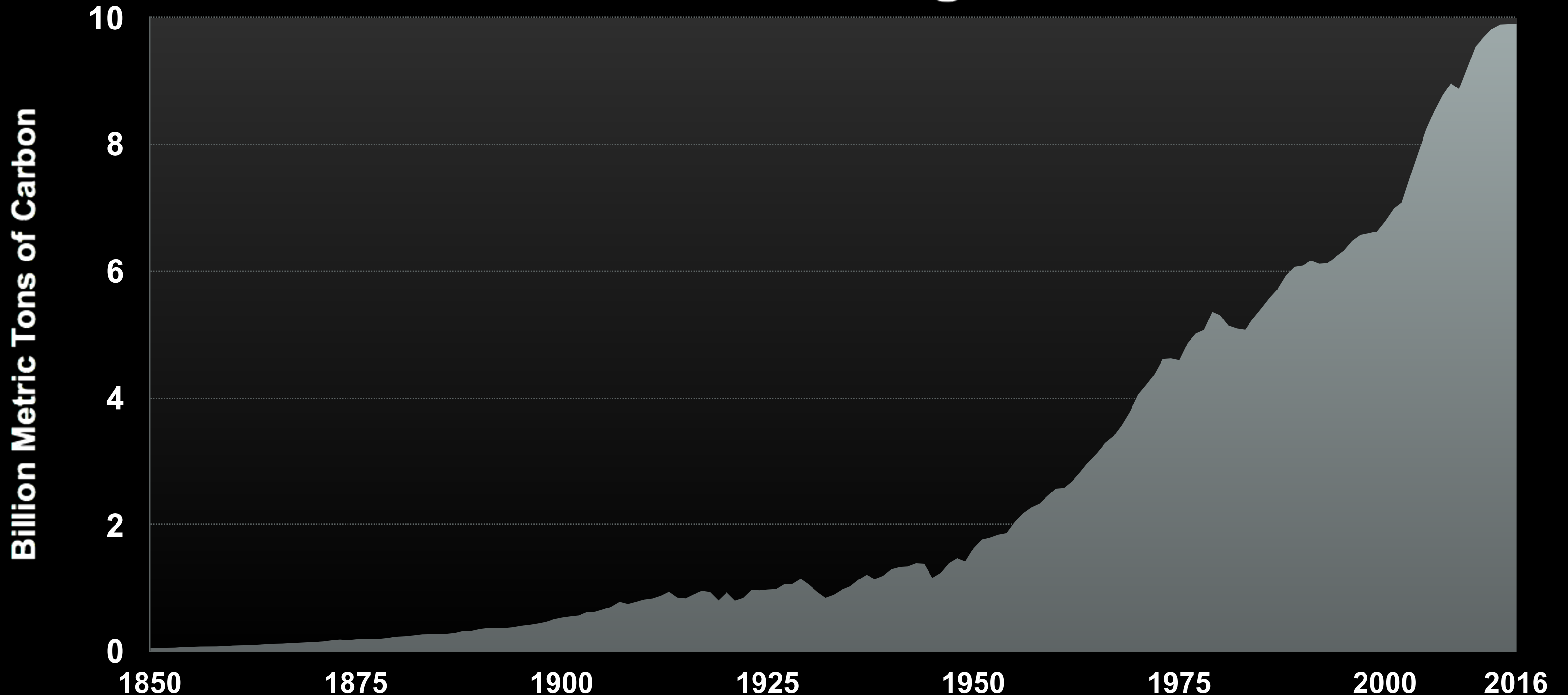
INDUSTRIAL PROCESSES

LAND TRANSPORT

INDUSTRIAL AGRICULTURE

LANDFILLS

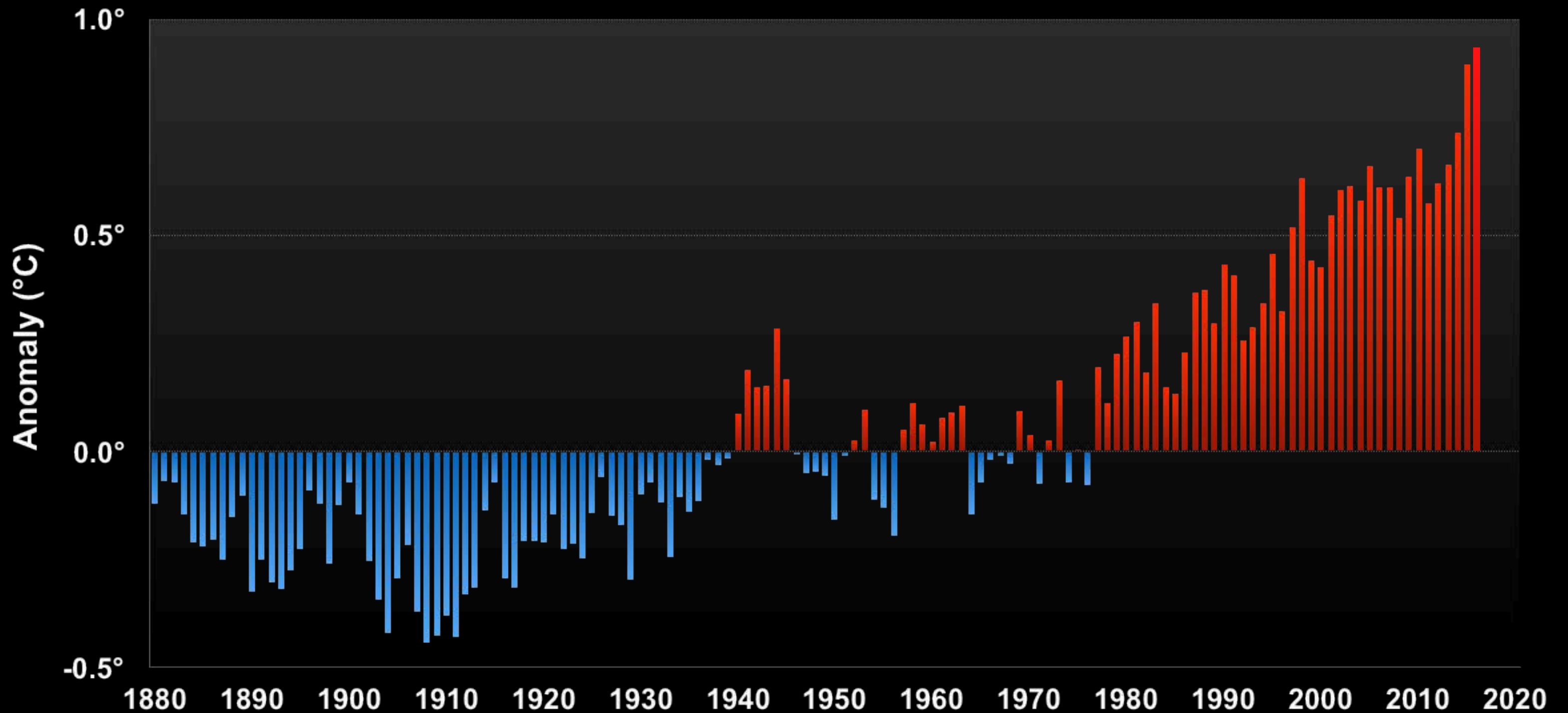
# The Largest Source of Global Warming Pollution Is the Burning of Fossil Fuels



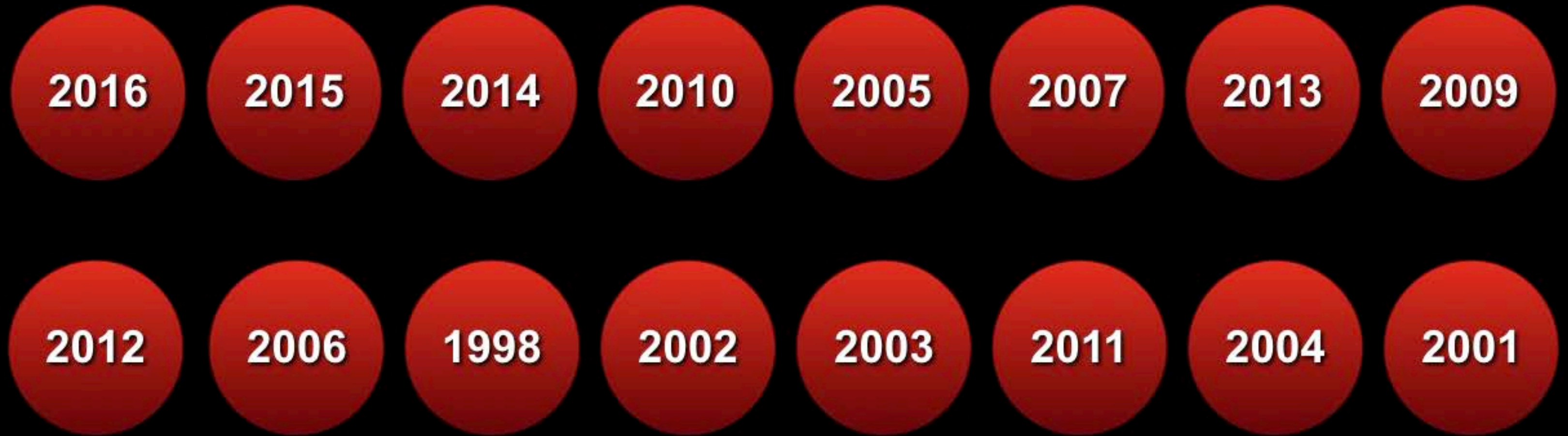
Data: U.S. Department of Energy/CDIAC

# Global Surface Temperature – Departure from Average

1880 – 2016



# 16 of the 17 Hottest Years on Record Have Occurred Since the Year 2001



# The Hottest Year Ever Measured...



**2016**



TRINITY  
CHURCH  
1775-1776

TRINITY CHURCH IN THE CITY OF BOSTON

Experience  
Trinity

Sunday, 10:00 am  
11:00 am, 8:00 pm

The Mass at Trinity

Sunday, 8:00 am  
10:00 am, 8:00 pm

Well-Invited to  
Celebrate Trinity

Sunday, 8:00 am  
10:00 am, 8:00 pm

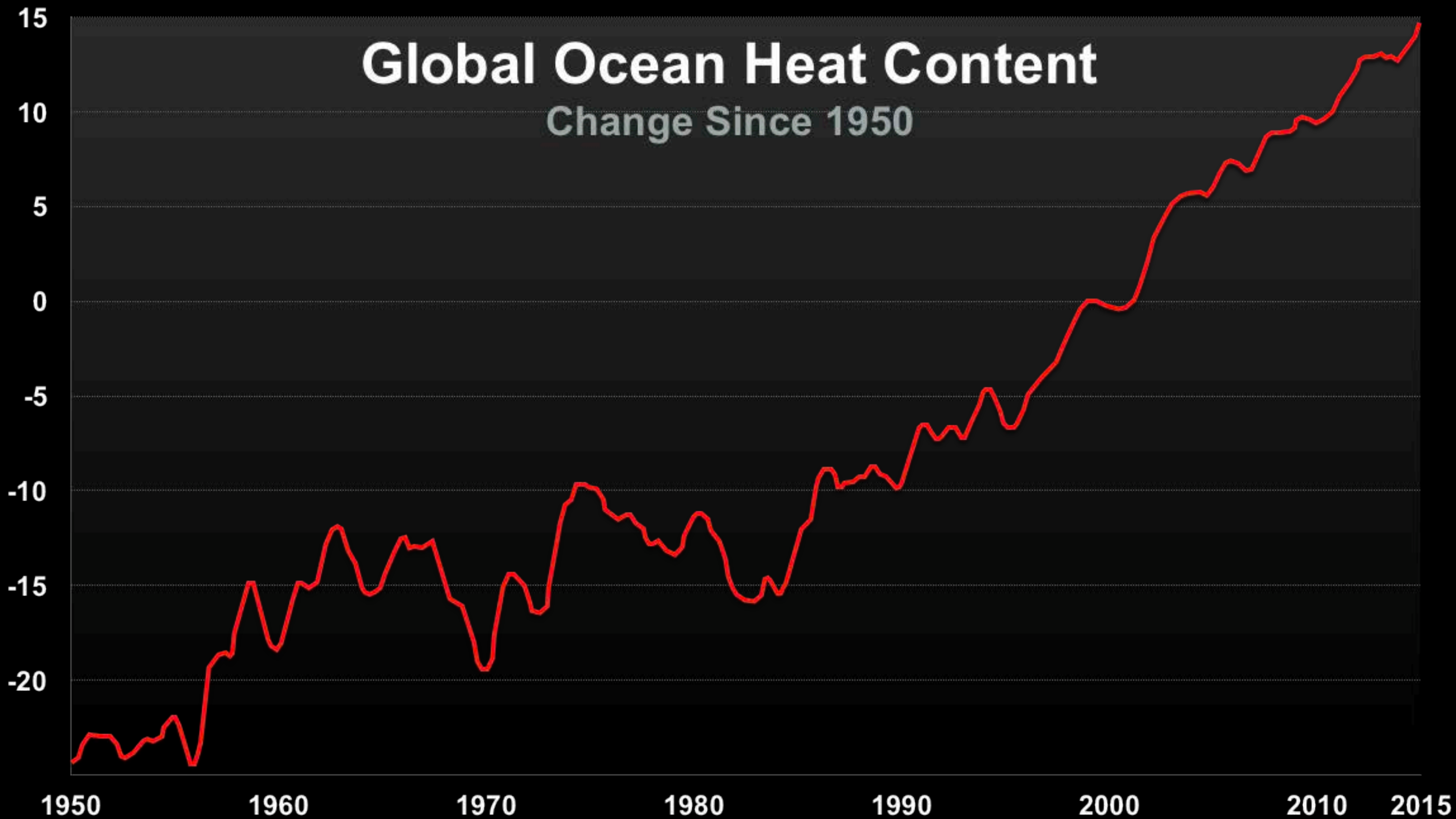


PROUD  
TO WELCOME  
ALL

# Global Ocean Heat Content

## Change Since 1950

Ocean Heat Content ( $10^{22}$  J)



Data: L. Cheng, K. E. Trenberth, et al., "Improved estimates of ocean heat content from 1960 to 2015," *Science Advances*, 10 March 2017

# Three Category 4 Hurricanes at One Time

August 30, 2015

*Hawaii*

**Hurricane  
Kilo**

**Hurricane  
Ignacio**

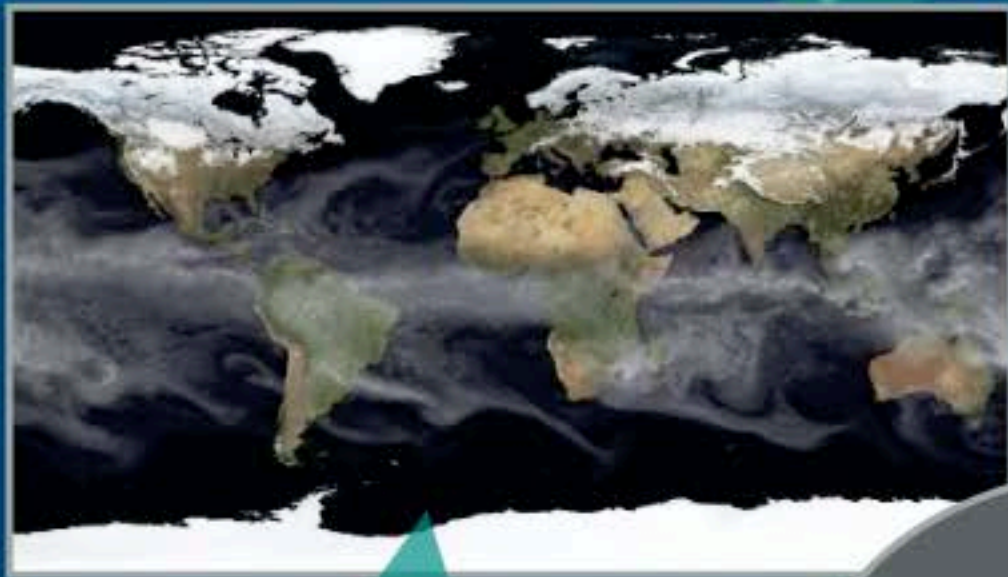
**Hurricane  
Jimena**

NOAA

Source: NOAA



**Evaporation**



**Precipitation**



**The  
Hydrological  
Cycle**



**Water Returns to the Sea**



# Tamil Nadu, India

December 2, 2015



**The same extra heat that evaporates more water from the ocean, causing bigger downpours and floods...**



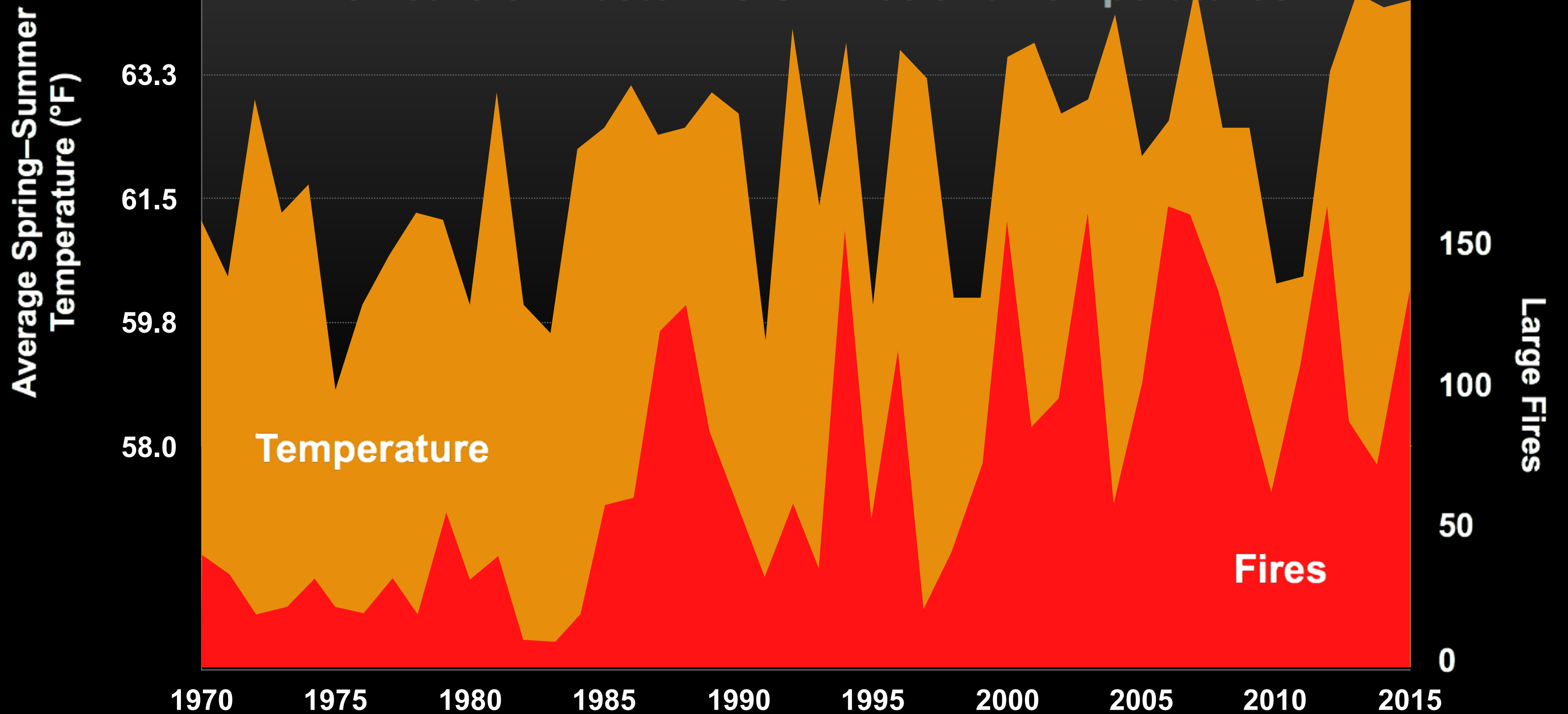
**...pulls moisture even more quickly from the soil, causing longer and deeper droughts.**

# São Paulo State, Brazil



# Hotter Years Typically Have More Fires

## 45 Years of Western U.S. Fires and Temperatures



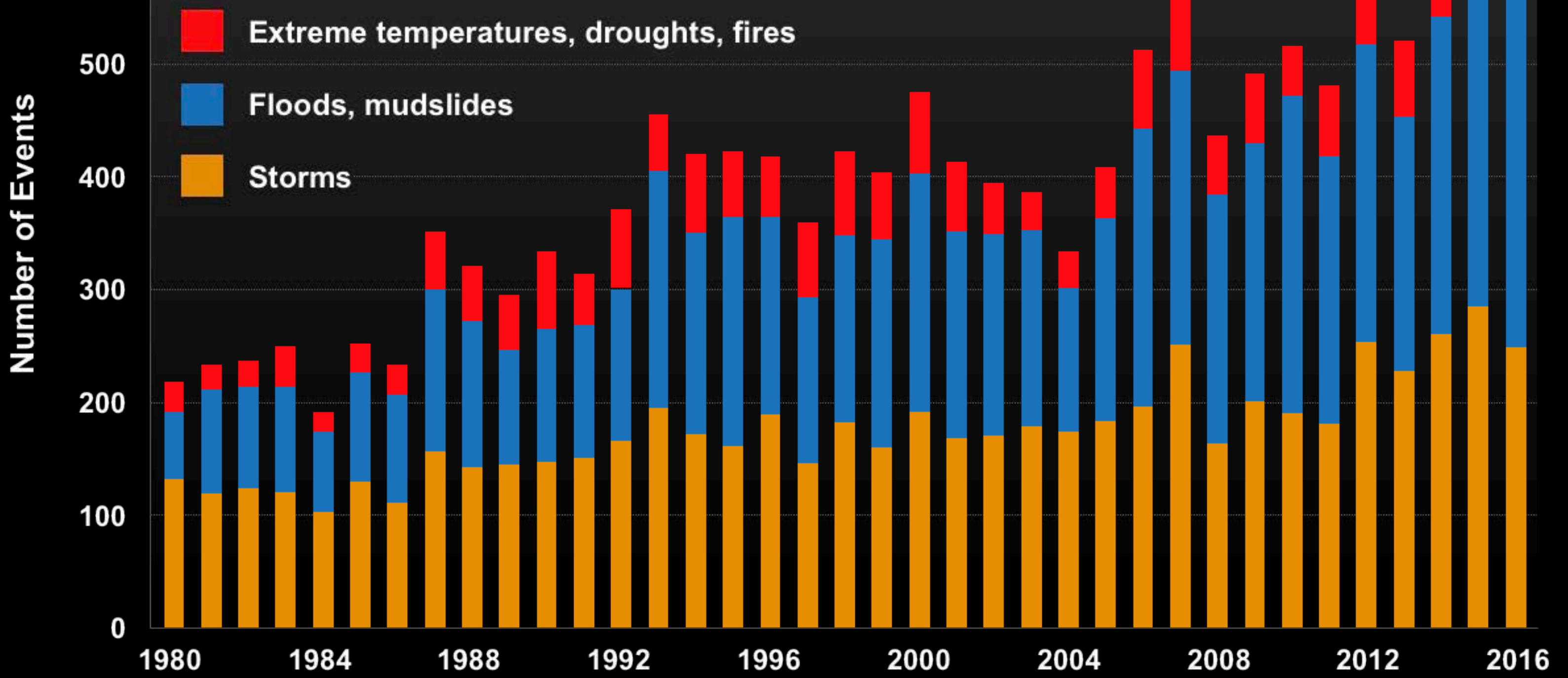
# Fort McMurray, Alberta, Canada

May 3, 2016



# Worldwide Extreme Weather Catastrophes

1980 – 2016





# Unnamed Glacier, Southwest Greenland

Summer 1935



3

# Unnamed Glacier, Southwest Greenland

Summer 2013

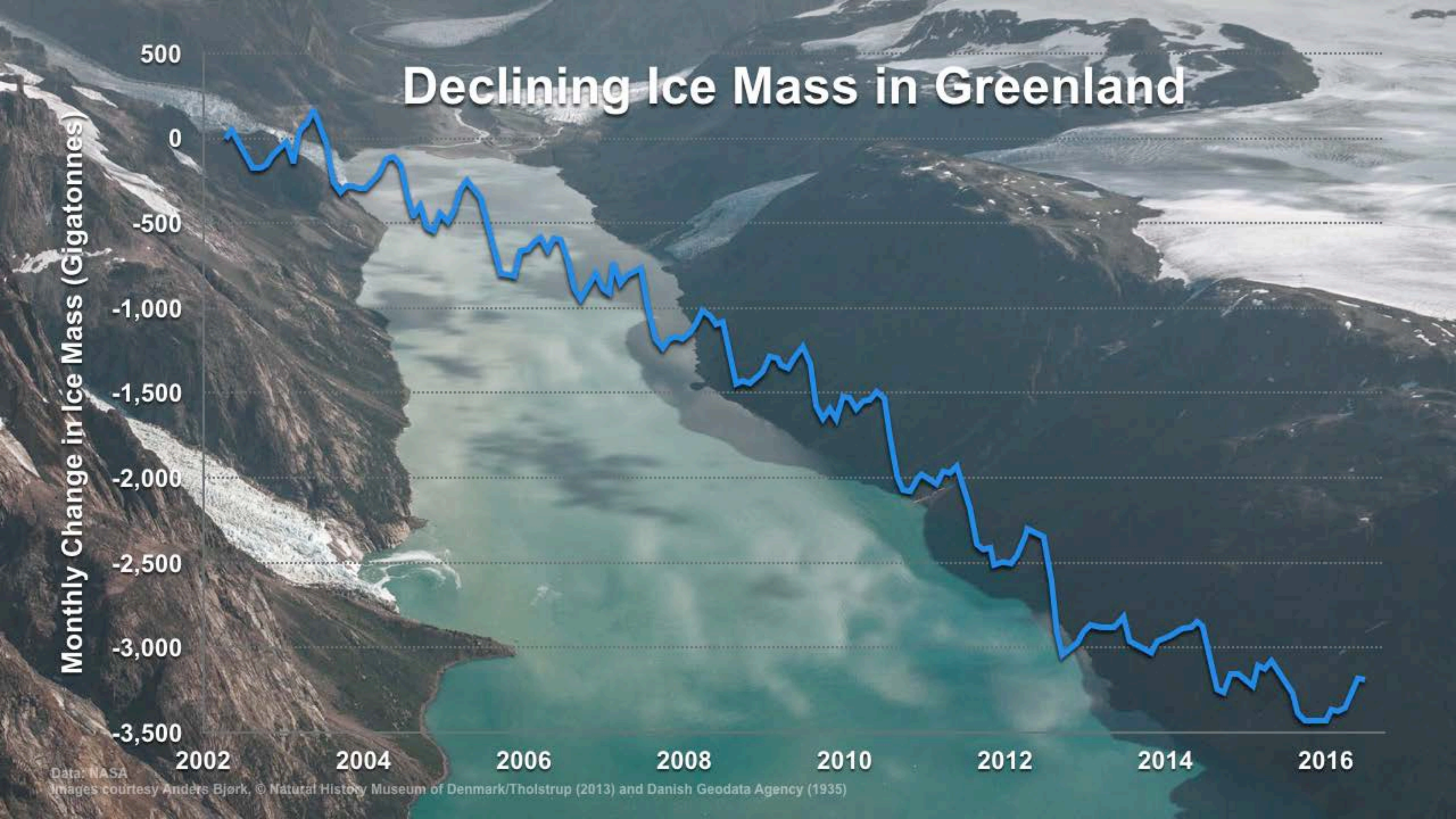
# Declining Ice Mass in Greenland

Monthly Change in Ice Mass (Gigatonnes)

500  
0  
-500  
-1,000  
-1,500  
-2,000  
-2,500  
-3,000  
-3,500

2002 2004 2006 2008 2010 2012 2014 2016

Data: NASA  
Images courtesy Anders Bjørk, © Natural History Museum of Denmark/Tholstrup (2013) and Danish Geodata Agency (1935)



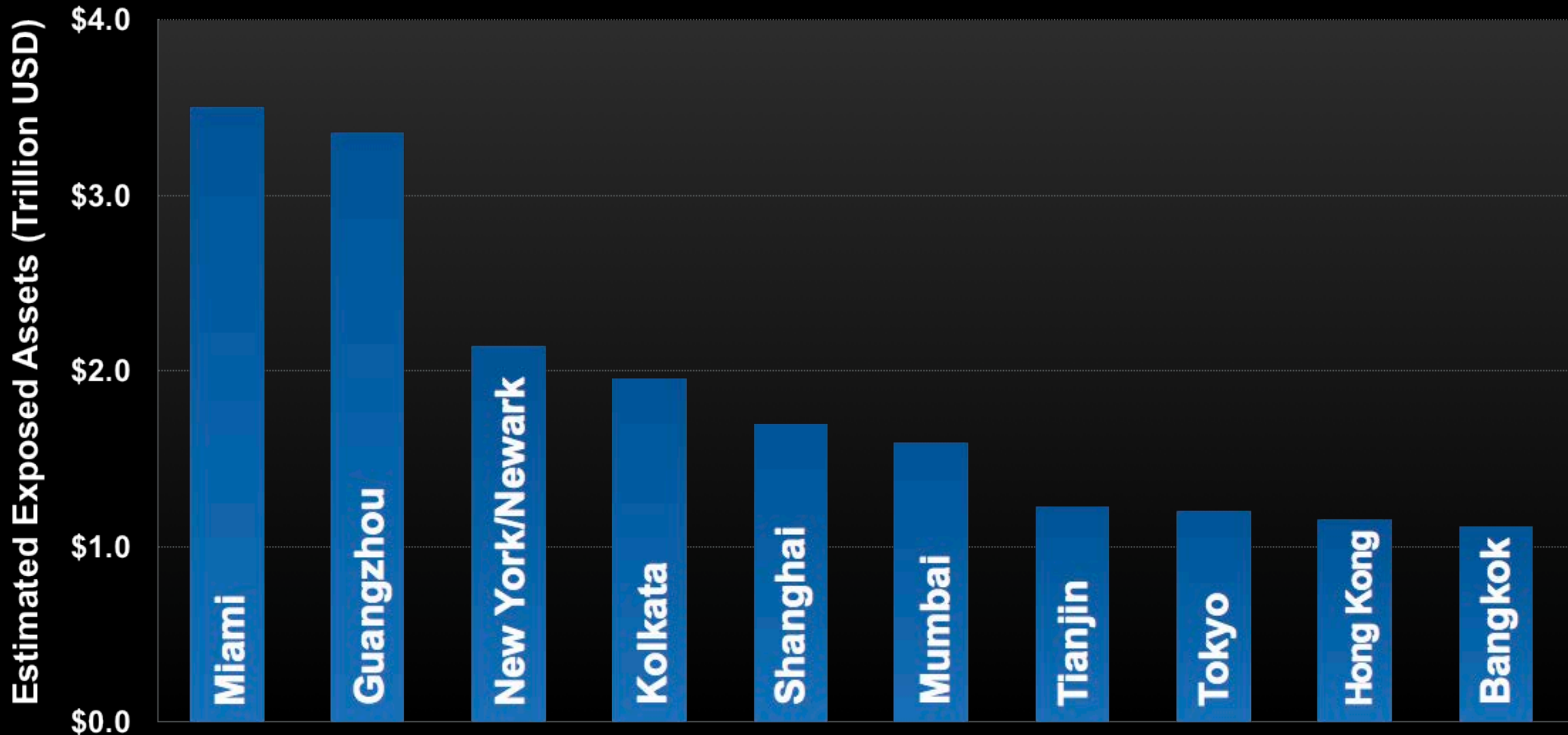
# Miami Beach, Florida

September 29, 2015



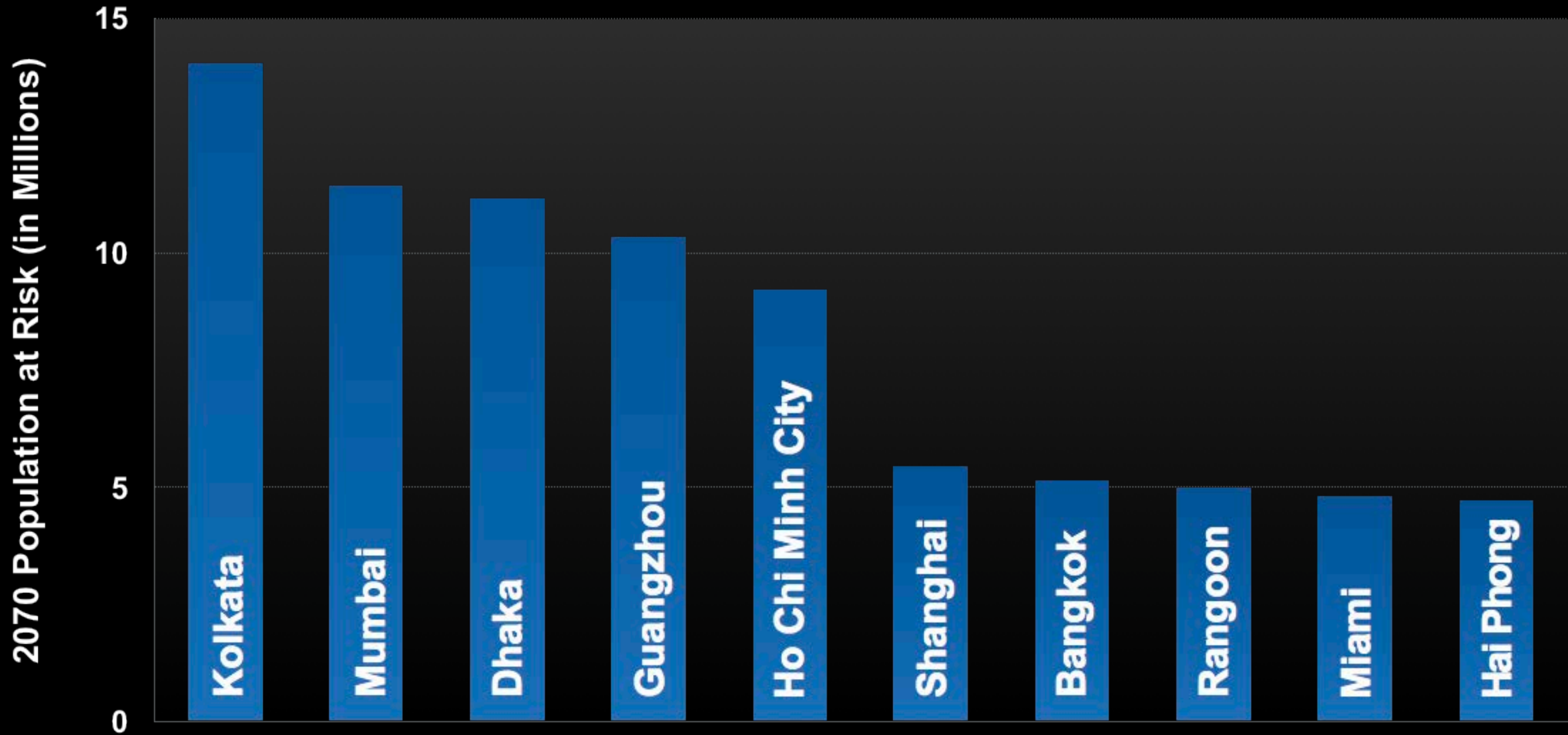
# Top 10 Cities at Risk from Sea Level Rise in 2070

By Assets at Risk



# Top 10 Cities at Risk from Sea Level Rise in 2070

## By Population at Risk



October 13, 2014

**U.S. Department of Defense**

*2014 Climate Change Adaptation Roadmap*


**Climate change**

**“will likely lead to**

**food and water shortages,**

**pandemic disease,**

**disputes over refugees and... natural  
disasters in regions across the globe.”**



**“I think there’s been an under-recognition of just  
how sensitive crops are to heat,  
and how fast heat exposure is increasing.”**

**David Lobell, Stanford University**



**“Climate Change  
is a  
Medical Emergency.”**

**Professor Hugh Montgomery, Co-Chair,  
The 2015 Lancet Commission on  
Health and Climate Change**

**June 2015**

# Tropical Diseases on the Move



- |   |   |  |  |
|---|---|--|--|
|  West Nile Virus   |  Chikungunya    |  Cryptococcus Gattii Fungus |  Zika Virus |
|  Rift Valley Fever |  Chagas Disease |  Dengue Fever               |  |



***Aedes aegypti*, the principal carrier of the Zika virus.**

**We now risk  
losing up to  
50% of all  
land-based  
species  
in this century**



# The Cost of Carbon

\$ *Political Instability*

\$ *Floods & Mudslides*

\$ *Wildfires*

\$ *Drought*

\$ *Storm Damage*

\$ *Ocean Acidification*

\$ *Infrastructure Loss*

\$ *Climate Refugees*



\$ *Species Extinction*

\$ *Melting Glaciers*

\$ *Famine*

\$ *Water Scarcity*

\$ *Ecosystem Loss*

\$ *Our Way of Life*

\$ *Infectious Diseases*

\$ *Sea Level Rise*

\$ *“The #1 Threat to the  
Global Economy”*

*... And much, much more*

**So...**

**Must we change?**

**Yes!**

**2. Can we change?**

**We have  
the solutions  
at hand...**



# Green Energy Progress

How Do Projections Compare With Reality?

## 2000 Projection

Worldwide  
wind capacity  
will reach 30  
gigawatts by  
2010

## Reality

By 2016 that goal  
was exceeded by  
a factor of

**16 x**

# Global Wind Energy Capacity

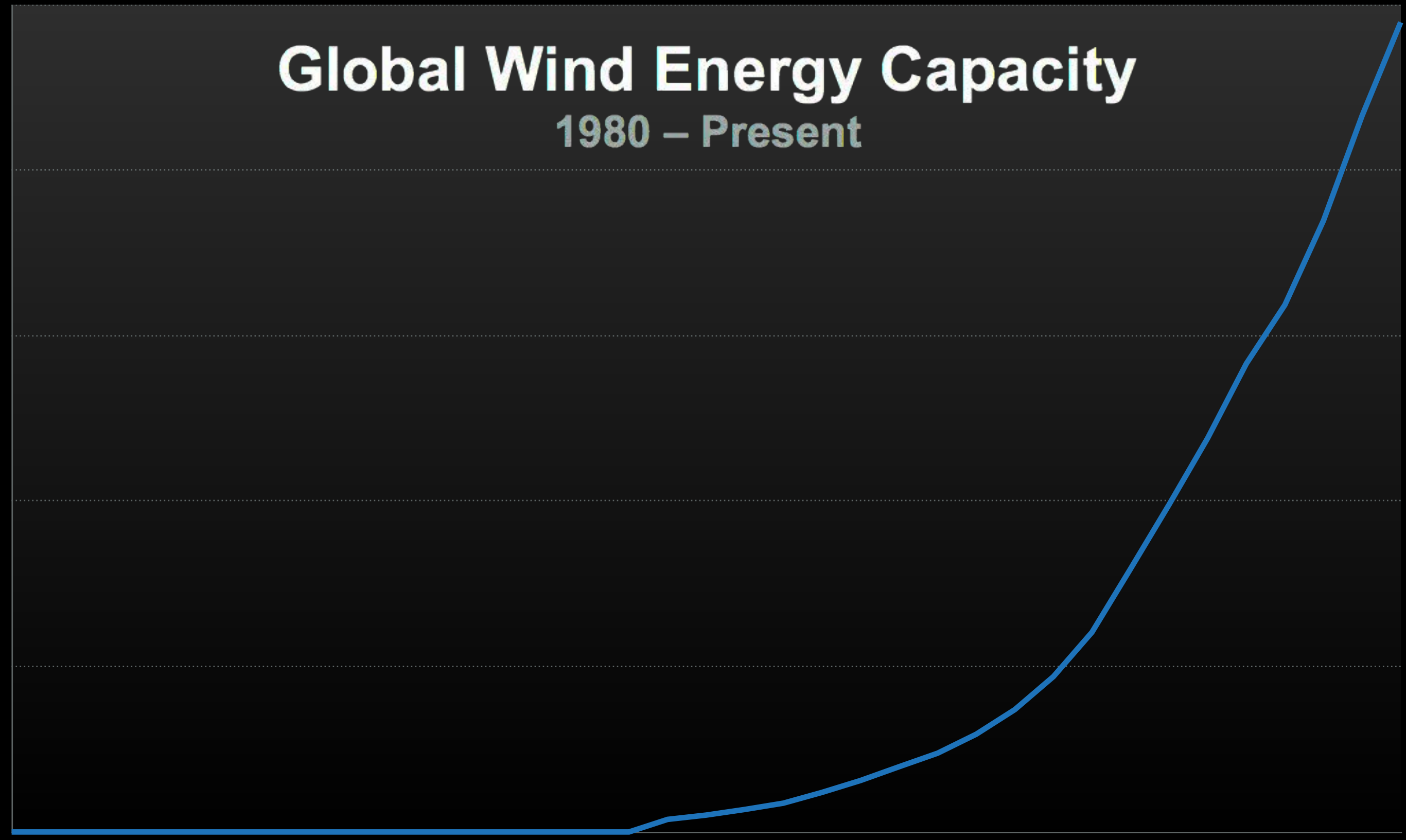
1980 – Present

Wind Capacity (Megawatts)

500,000  
400,000  
300,000  
200,000  
100,000

1980 1984 1988 1992 1996 2000 2004 2008 2012 2016

Data: Earth Policy Institute/BNEF





**Globally, wind could  
supply worldwide  
electricity consumption  
40 times over**

# Solar Energy Progress

How Do Projections Compare With Reality?

## 2002 Projection

The solar energy market will grow one gigawatt per year by 2010

## Reality

The reality is that goal was exceeded by

**17 x**

# Solar Energy Progress

How Do Projections Compare With Reality?

## 2002 Projection

The solar energy market will grow one gigawatt per year by 2010

## Reality

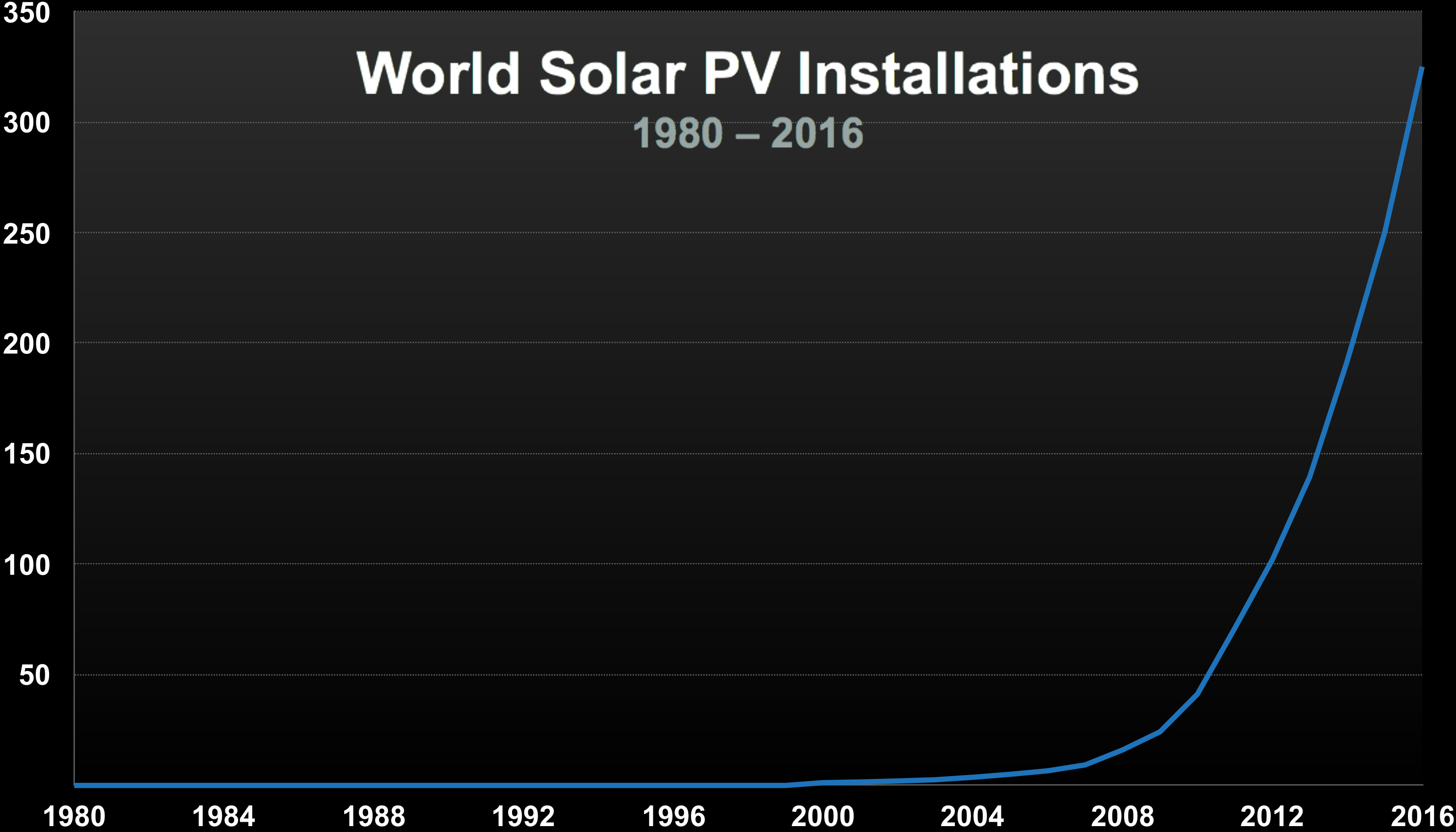
In 2016 it was exceeded by

**75 x**

# World Solar PV Installations

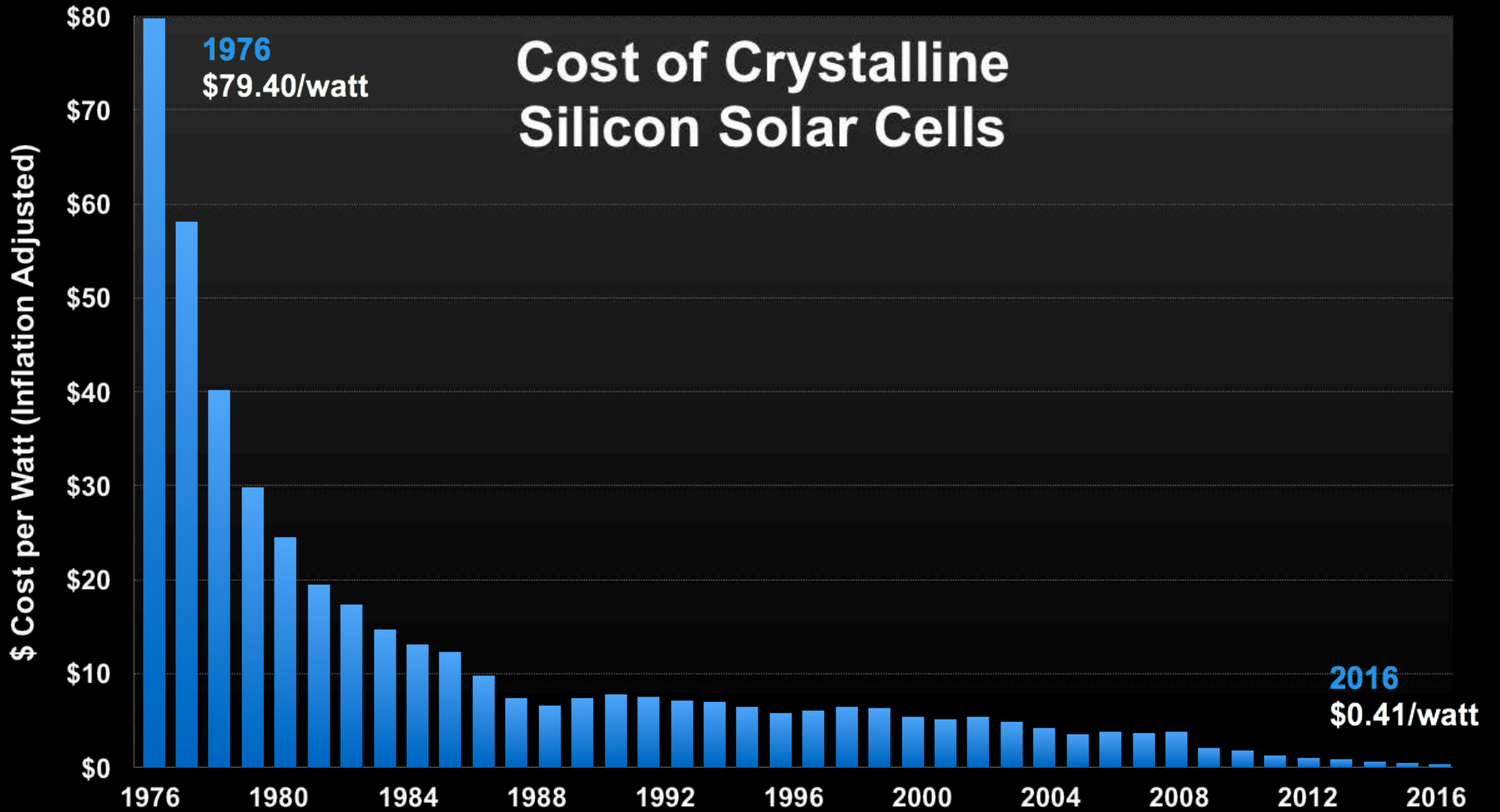
1980 – 2016

Gigawatts (Cumulative)



Data: Earth Policy Institute/BP, *Statistical Review of World Energy*/BNEF

# Cost of Crystalline Silicon Solar Cells

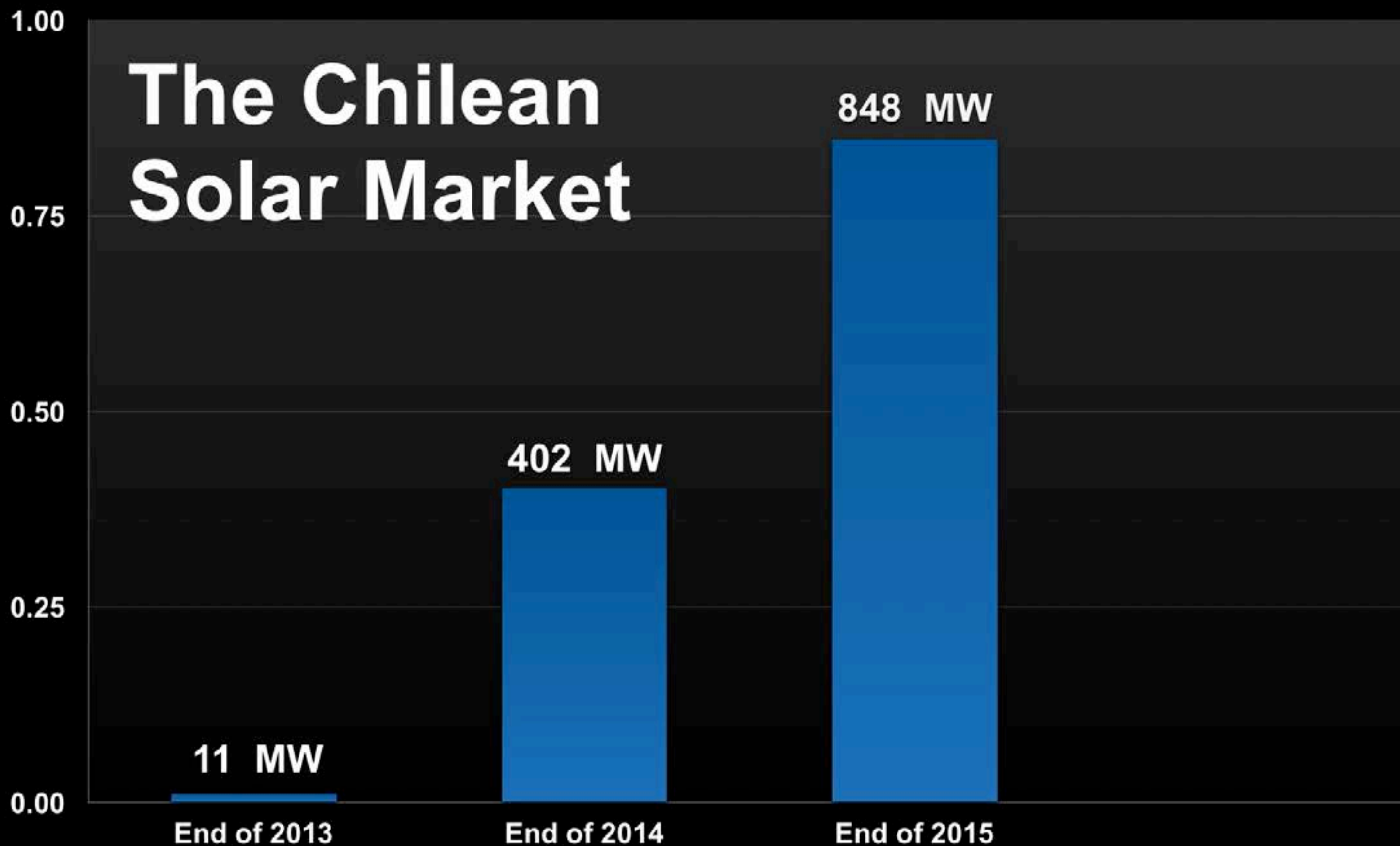






# The Chilean Solar Market

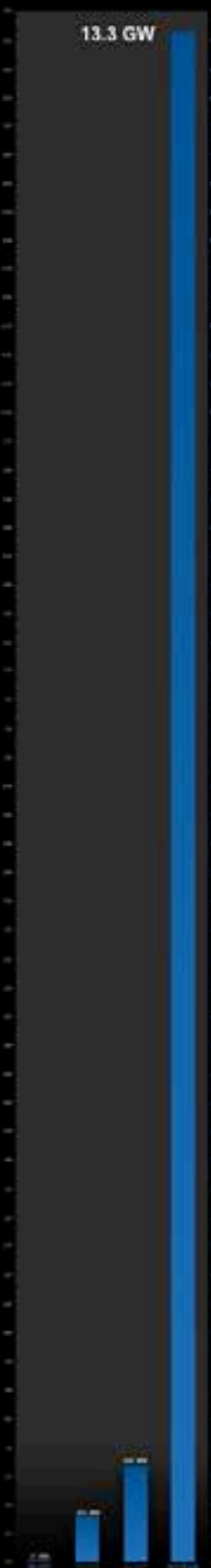
Total Installed Solar Capacity (Gigawatts)



Data: Greentech Media, *Latin America PV Playbook*; CleanTechnica

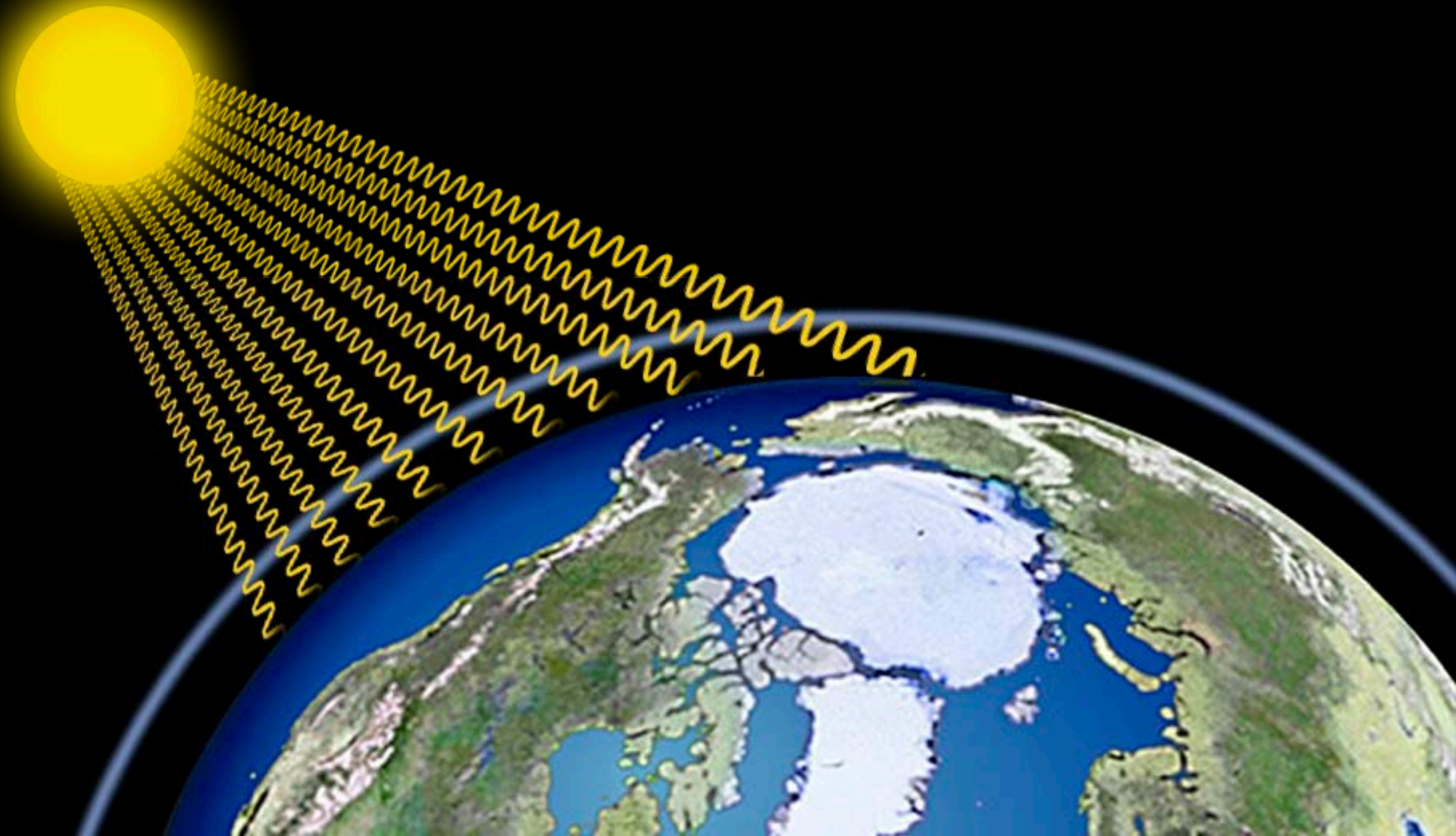
# The Chilean Solar Market

Total Installed Solar Capacity (Gigawatts)



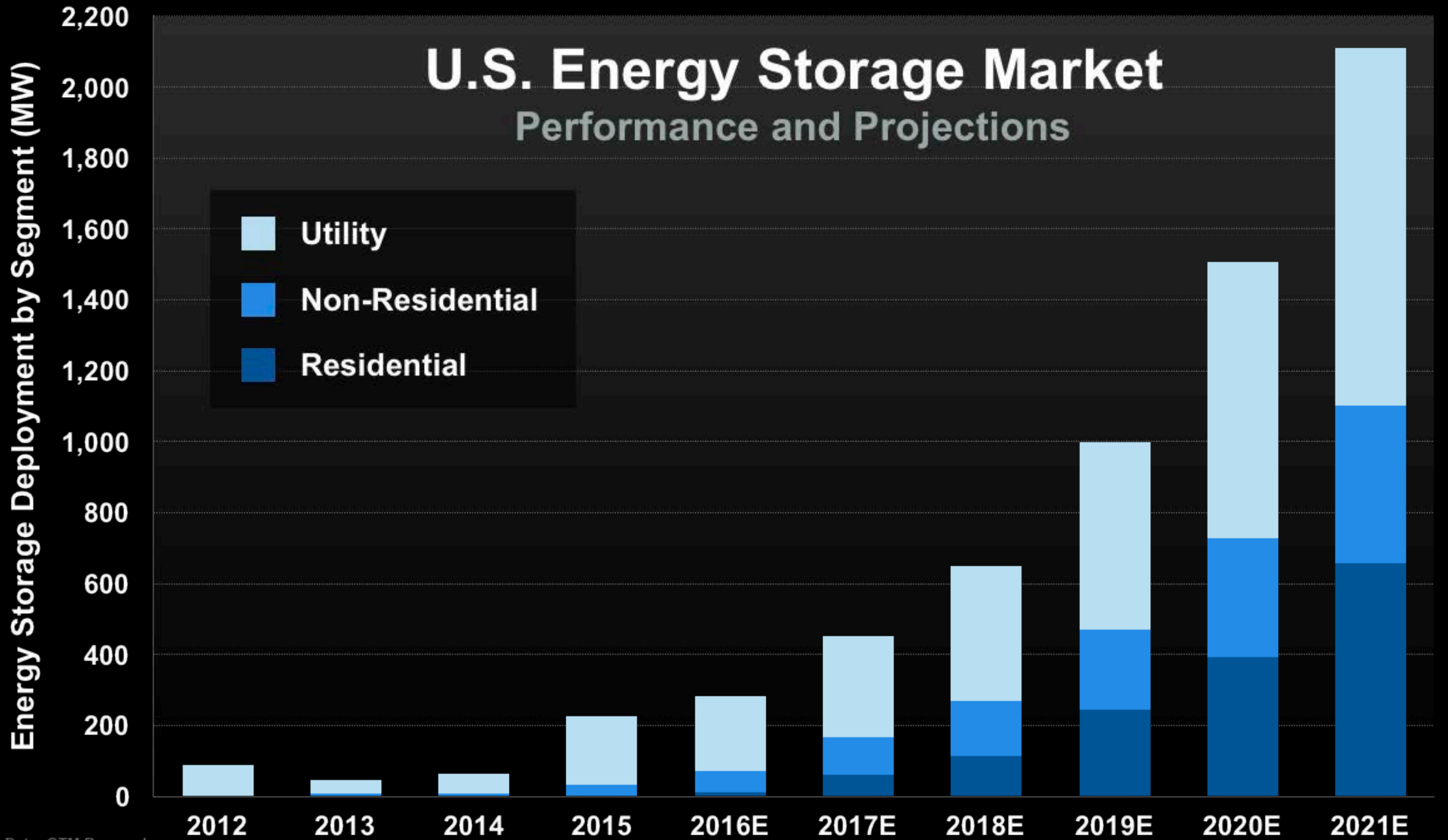
Chile has an additional **13.3 GW** of solar projects approved or under construction.

Enough solar energy reaches Earth **every hour**  
to fill all the world's energy needs **for a full year**

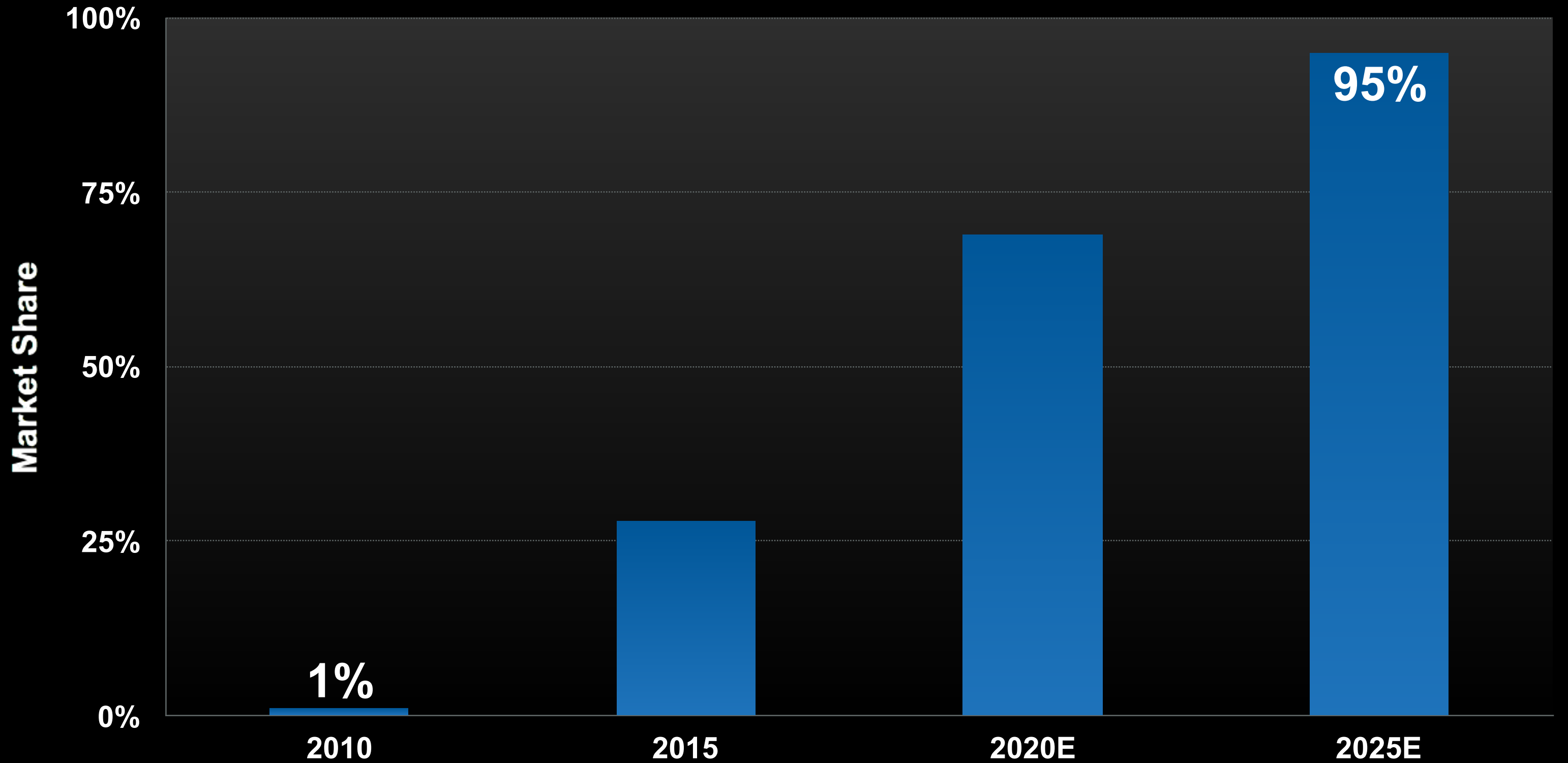


# U.S. Energy Storage Market

## Performance and Projections



# LED Lights: Percentage of the Total Lighting Market



# Auto Manufacturers Are Moving to Electric Vehicles

## Companies with Electric Models in Production

<b>Tesla</b>	<b>Audi</b>	<b>Nissan</b>	<b>Fiat</b>	<b>Aixam</b>
<b>Toyota</b>	<b>CODA</b>	<b>Honda</b>	<b>Mitsubishi</b>	<b>Chery</b>
<b>Mercedes-Benz</b>	<b>ChangAn</b>	<b>JAC</b>	<b>Volkswagen</b>	<b>Citroën</b>
<b>BYD</b>	<b>Geely</b>	<b>Renault</b>	<b>Kandi</b>	<b>Citydom GmbH</b>
<b>Tata</b>	<b>Mullen</b>	<b>BAIC</b>	<b>\$mart</b>	<b>Kantanka</b>
<b>Qiantu</b>	<b>Mahindra</b>	<b>Kia</b>	<b>Bolloré</b>	<b>Buddy Electric</b>
<b>Venturi</b>	<b>Hyundai</b>	<b>BMW</b>	<b>Trumpchi</b>	<b>Kyburz</b>
<b>Goupil</b>	<b>Aston Martin</b>	<b>Chevy</b>	<b>Peugeot</b>	<b>Rayttle</b>
<b>GM</b>	<b>Exagon</b>	<b>Ford</b>	<b>Daimler</b>	<b>NIO</b>
	<b>Opel</b>	<b>Fisker</b>	<b>Subaru</b>	<b>Zotye</b>


**So...**

**Can we change?**

**Yes!**

**3. Will we change?**



A nighttime photograph of Paris, France, featuring the Eiffel Tower on the left, illuminated with golden lights. The tower's top is emitting a bright beam of light. In the foreground, the Seine River flows, with several boats and a bridge visible. The background shows the city's skyline with various buildings and streetlights. The sky is a deep blue with some light clouds.

**In the 2015 Paris Agreement,  
virtually every nation in the world  
agreed to work together to achieve  
net zero greenhouse gas emissions.**

# People's Climate March, Washington, D.C.

April 29, 2017



**Join those who are using  
their **voices**  
their **votes**  
their **choices**  
to fight the climate crisis.**

Use your **voice**  
your **vote**  
your **choices**

**Speak Truth to Power**  
like your world depends on it.

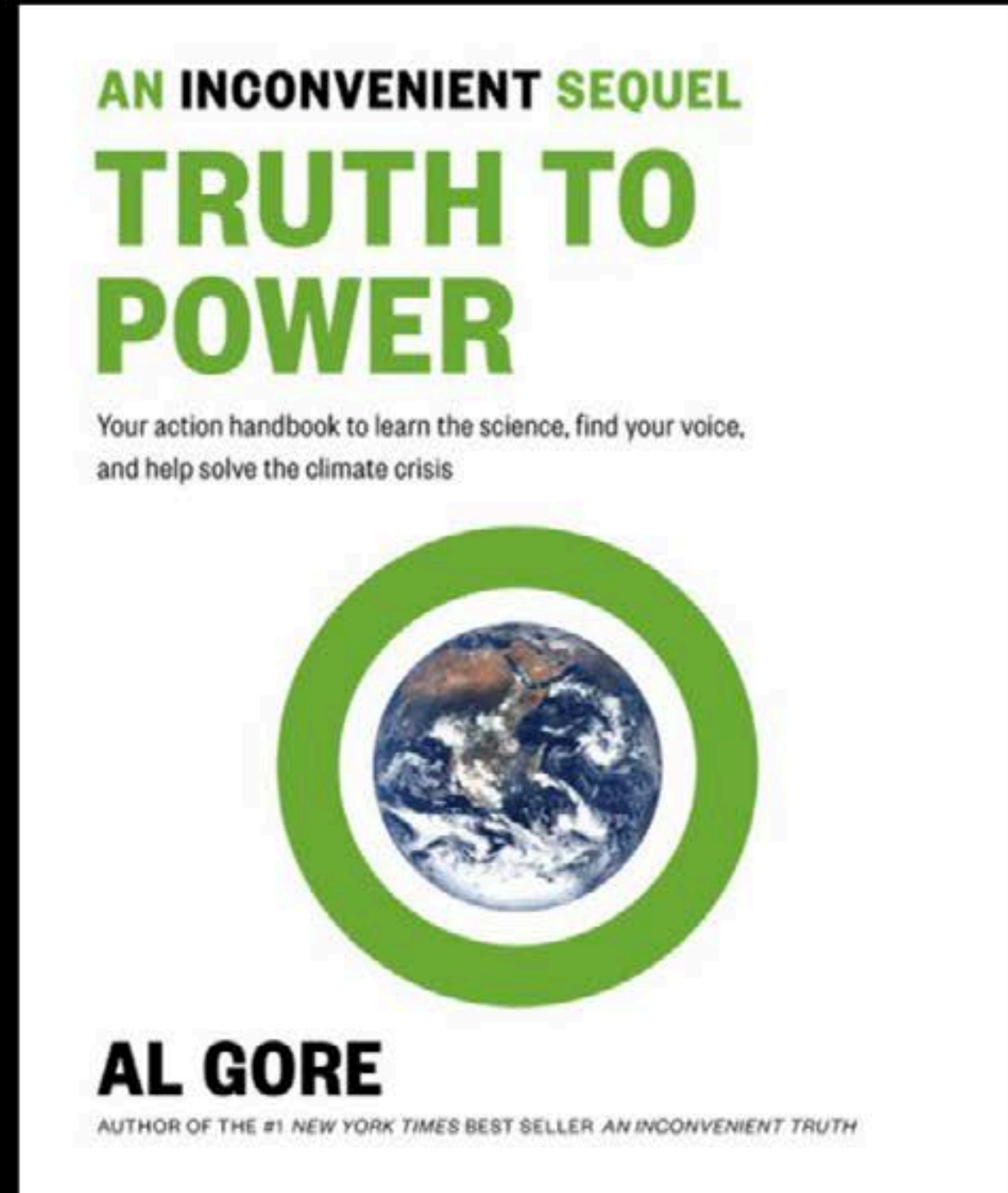


**Your world depends on it.**

# Take the Next Step—See the Movie and Read the Book



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