

**CLIMATE CHANGE WORKSHOP: 16<sup>h</sup> February**  
**2019**

**SHOULD MSUNDUZI MUNICIPALITY  
IGNORE CLIMATE CHANGE?**

**Dr Simon Taylor ( PhD) Climate  
Reality and UKZN-EDTEA RLEDI**



Photo: NASA





# DAY ZERO

## IS WHEN THE WATER RUNS OUT

But, we need to consider what will happen  
if our water runs out and we reach Day Zero...

**Food Grows Where Water Flows**





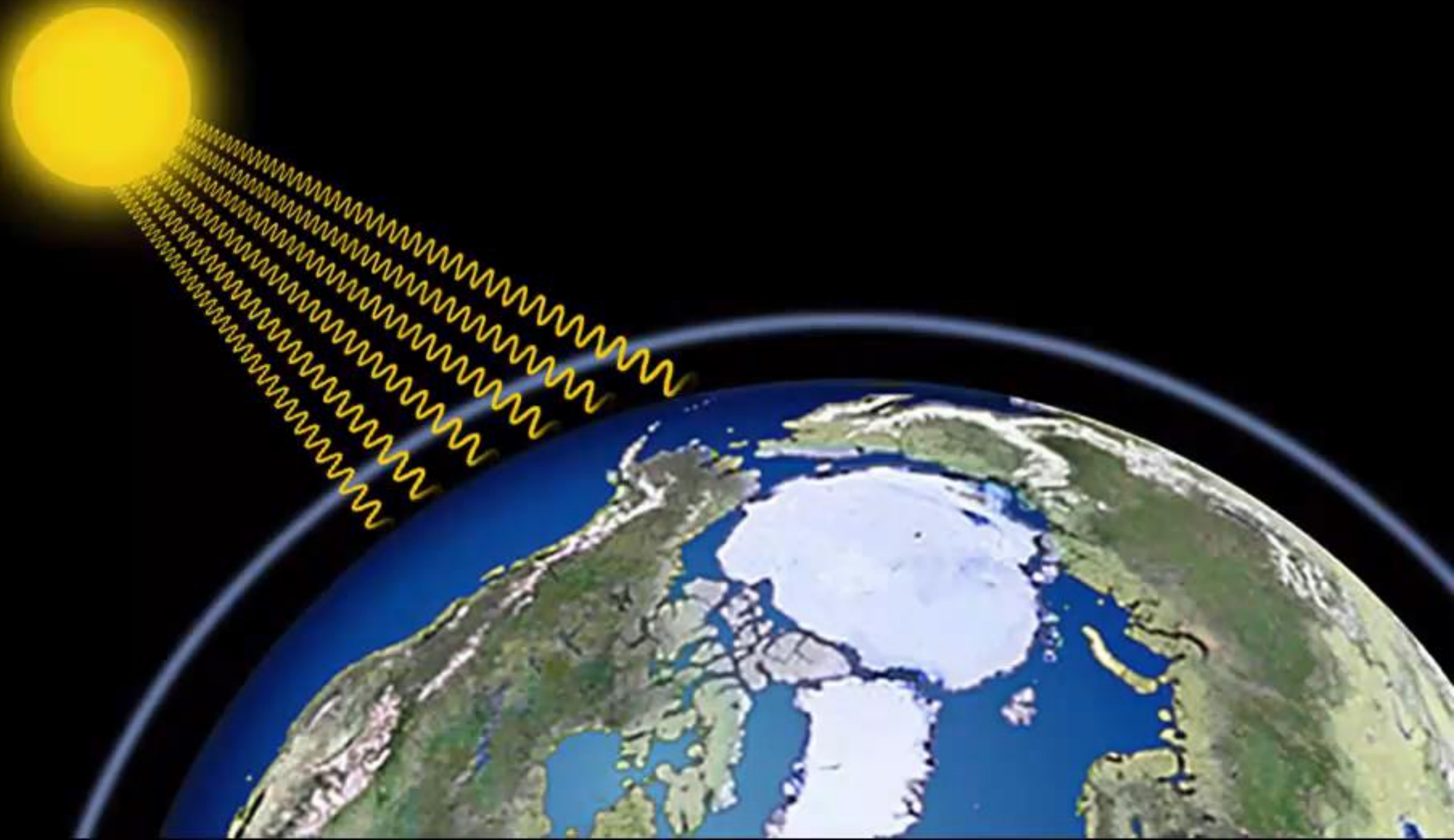




**We are Dumping 110 Million Tons of Manmade Global Warming Pollution into the Atmosphere every 24 Hours**



Solar radiation  
in the form of lightwaves  
passes through the  
atmosphere







THAWING PERMAFROST

COAL MINING

COAL PLANTS

AIR TRANSPORT

OIL PRODUCTION

INDUSTRIAL PROCESSES

FERTILIZATION

LAND TRANSPORT

LANDFILLS



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

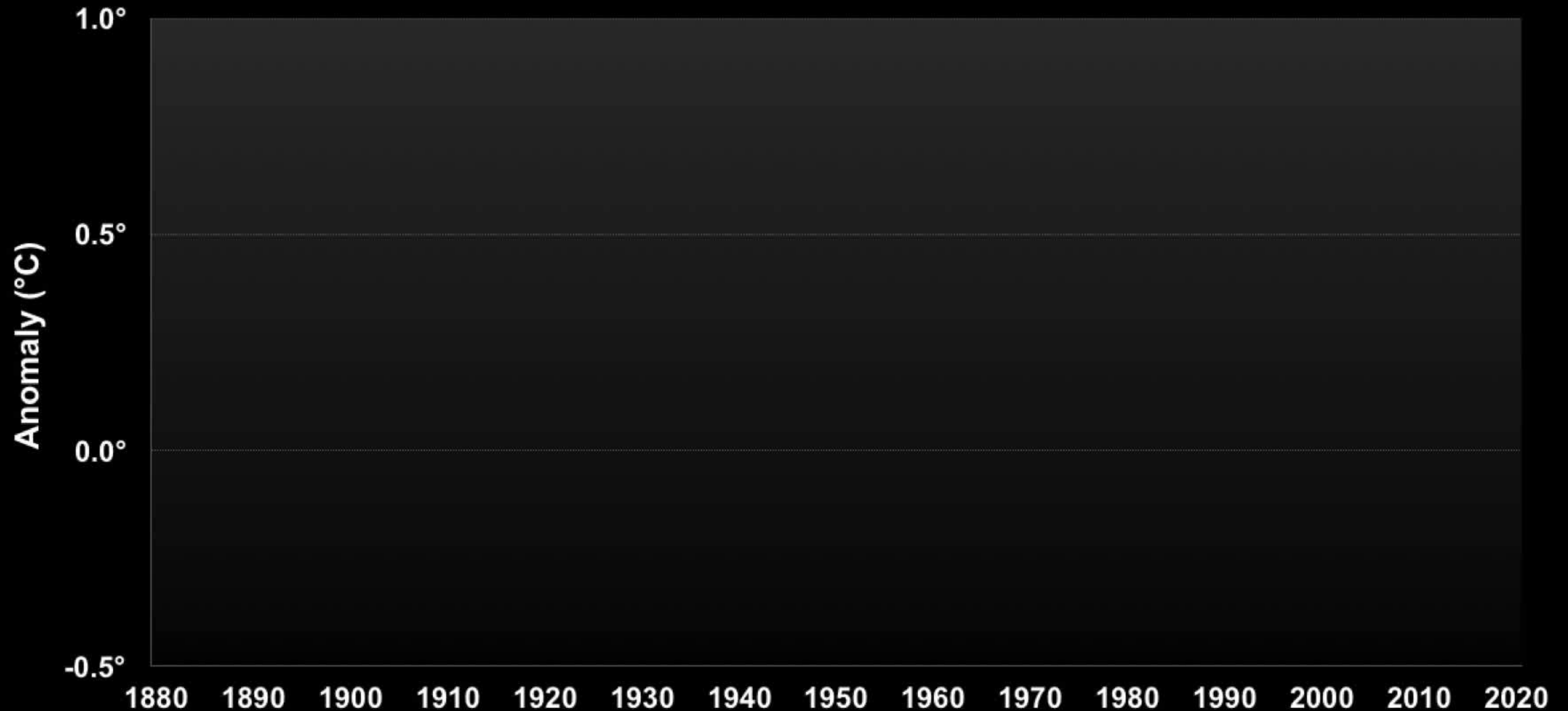


Data: U.S. Department of Energy/CDIAC



# Global Surface Temperature – Departure from Average

1880 – 2016



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



2016







# 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**

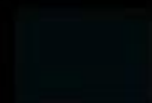
**Hurricane  
Jimena**

NOAA

Source: NOAA



Evaporation



**The  
Hydrological  
Cycle**







# Tamil Nadu, India

December 2, 2015





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



# São Paulo State, Brazil





# Cape Town, South Africa

<https://www.youtube.com/watch?v=RJ4Z2bOh5jo>



# Hotter Years Typically Have More Fires

45 Years of Western U.S. Fires and Temperatures

65.0

63.3

61.5

59.8

58.0

1970

1975

1980

1985

1990

1995

2000

2005

2010

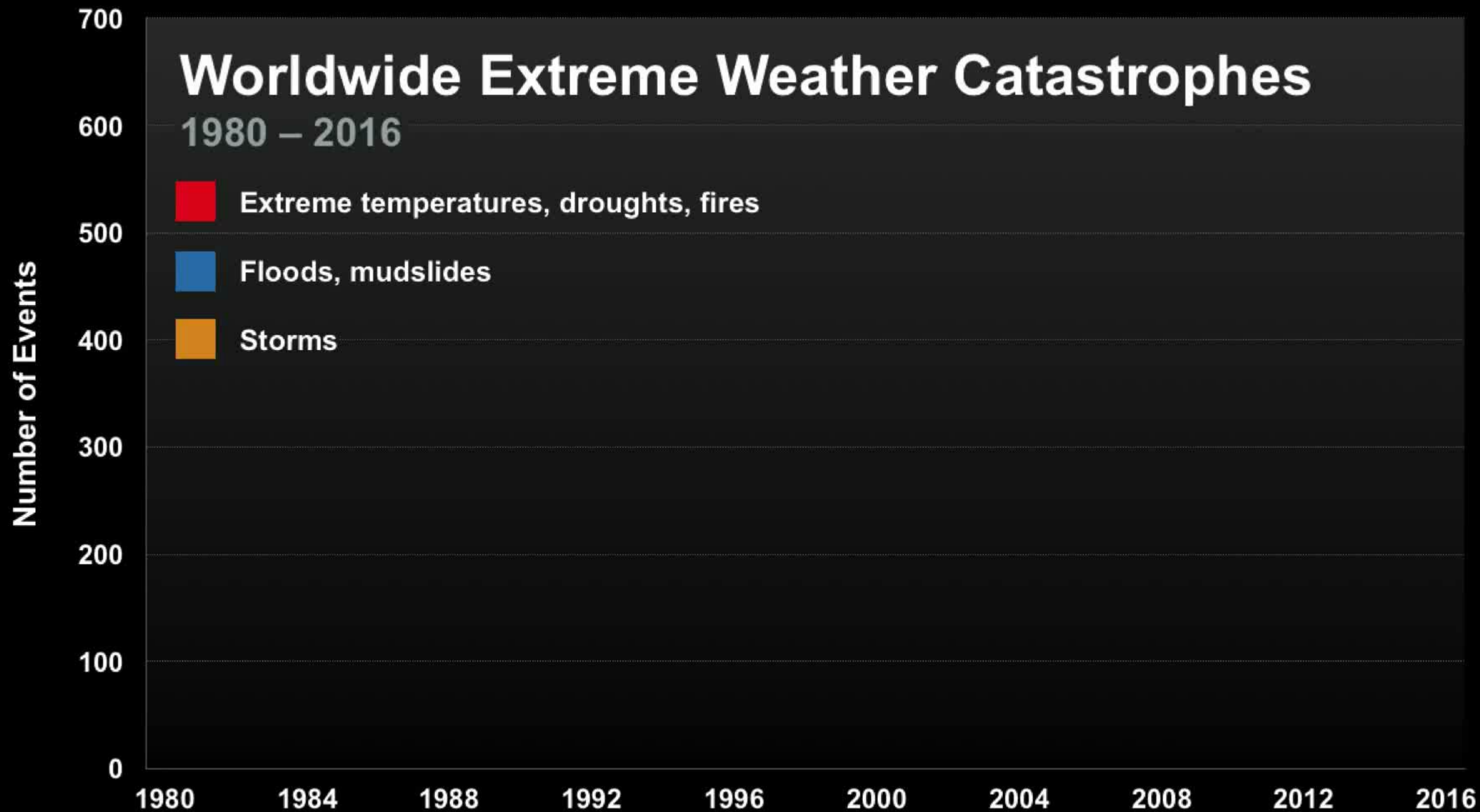
2015



# Fort McMurray, Alberta, Canada

May 3, 2016











# Miami Beach, Florida

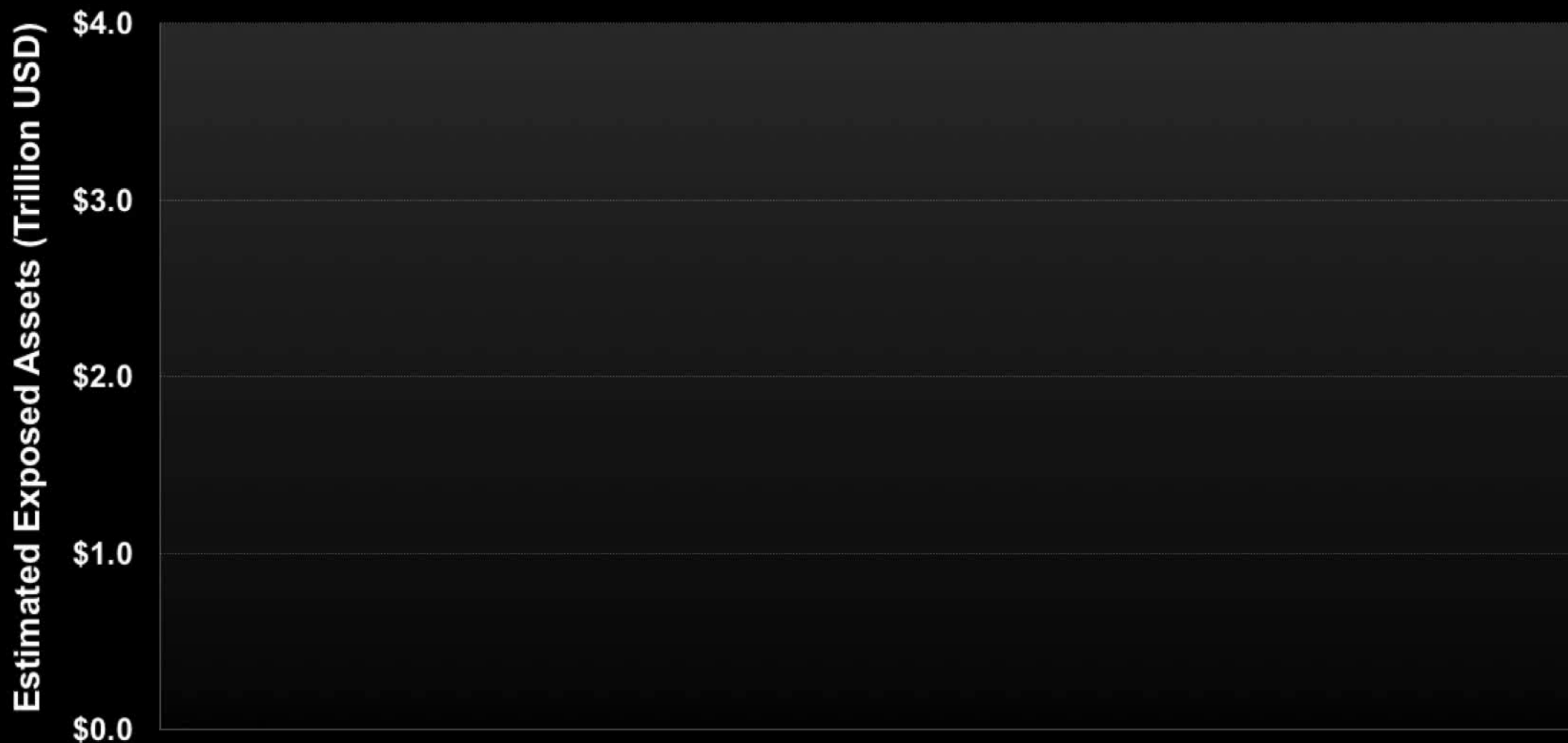
September 29, 2015





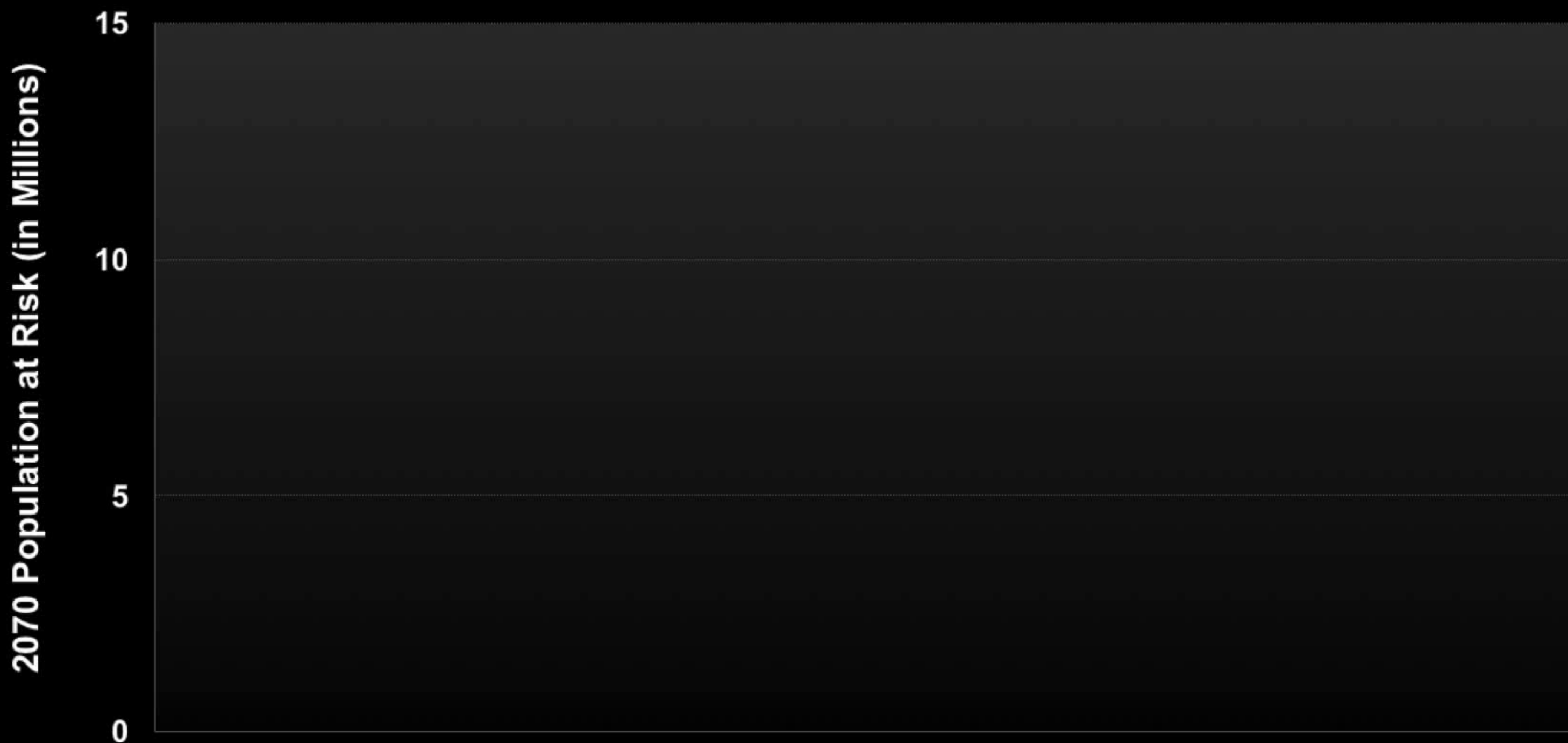
# Top 10 Cities at Risk from Sea Level Rise in 2070

By Assets at Risk



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

By Population at Risk











**“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







*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

\$



**So...**

**Must we change?**



**2. Can we change?**

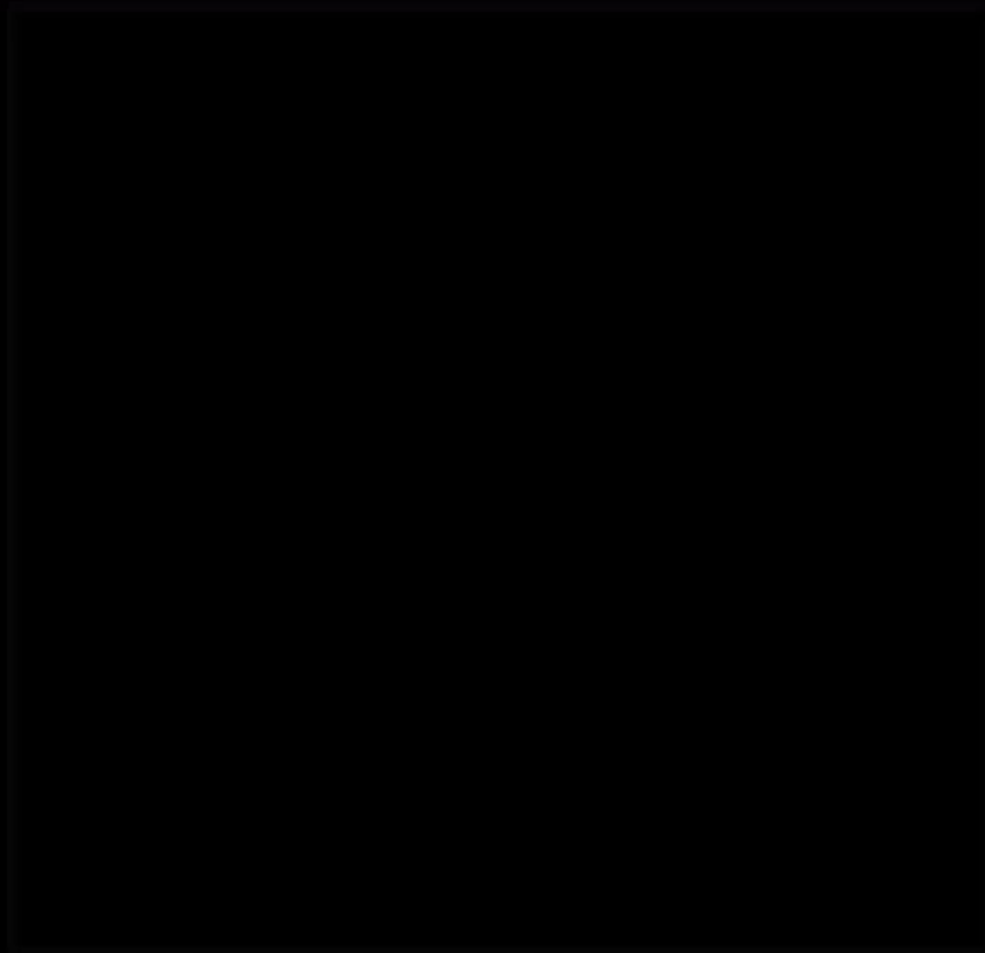
**We have  
the solutions  
at hand...**



# Green Energy Progress

## How Do Projections Compare With Reality?

2000 Projection



# 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





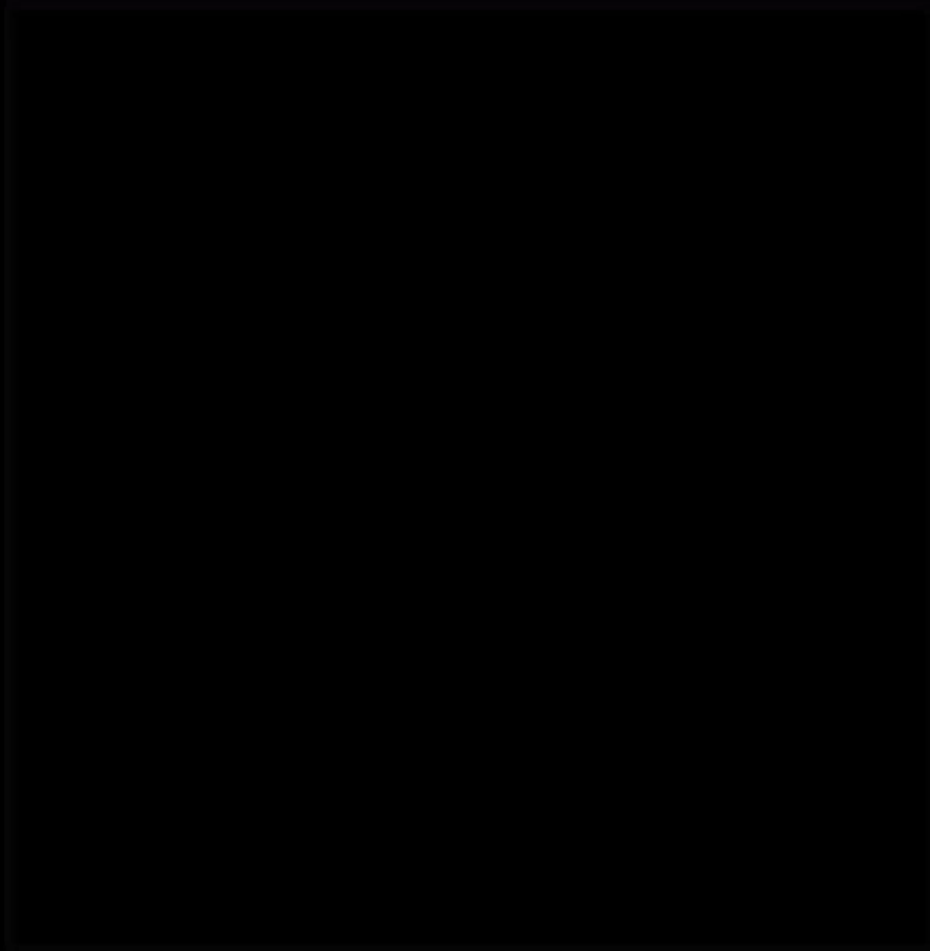


**Globally, wind could  
supply worldwide  
electricity consumption  
40 times over**

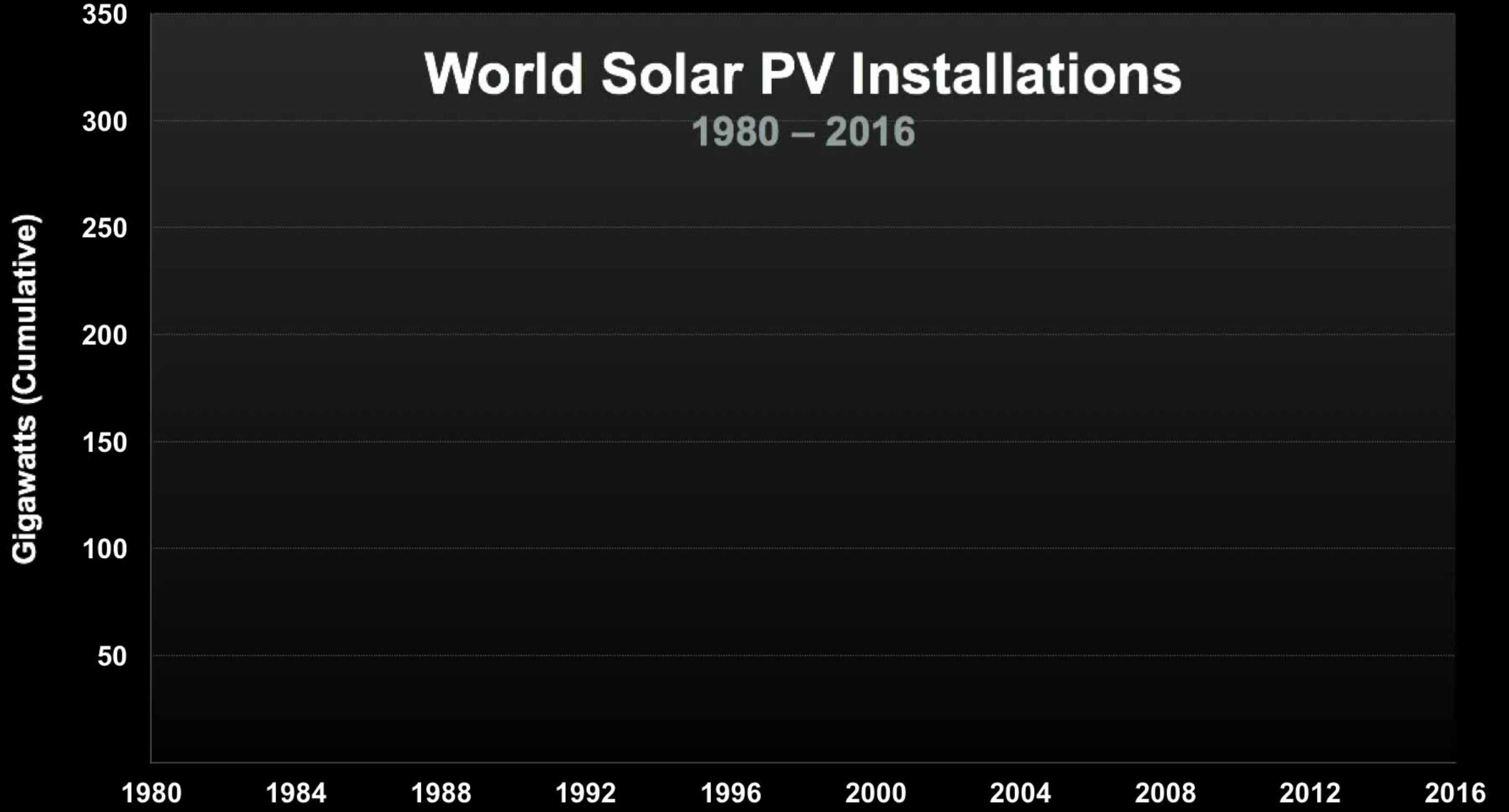
# Solar Energy Progress

## How Do Projections Compare With Reality?

2002 Projection







# Cost of Crystalline Silicon Solar Cells

\$ Cost per Watt (Inflation Adjusted)

\$80  
\$70  
\$60  
\$50  
\$40  
\$30  
\$20  
\$10  
\$0

1976 1980 1984 1988 1992 1996 2000 2004 2008 2012 2016







# The Chilean Solar Market

Total Installed Solar Capacity (Gigawatts)

1.00

0.75

0.50

0.25

0.00

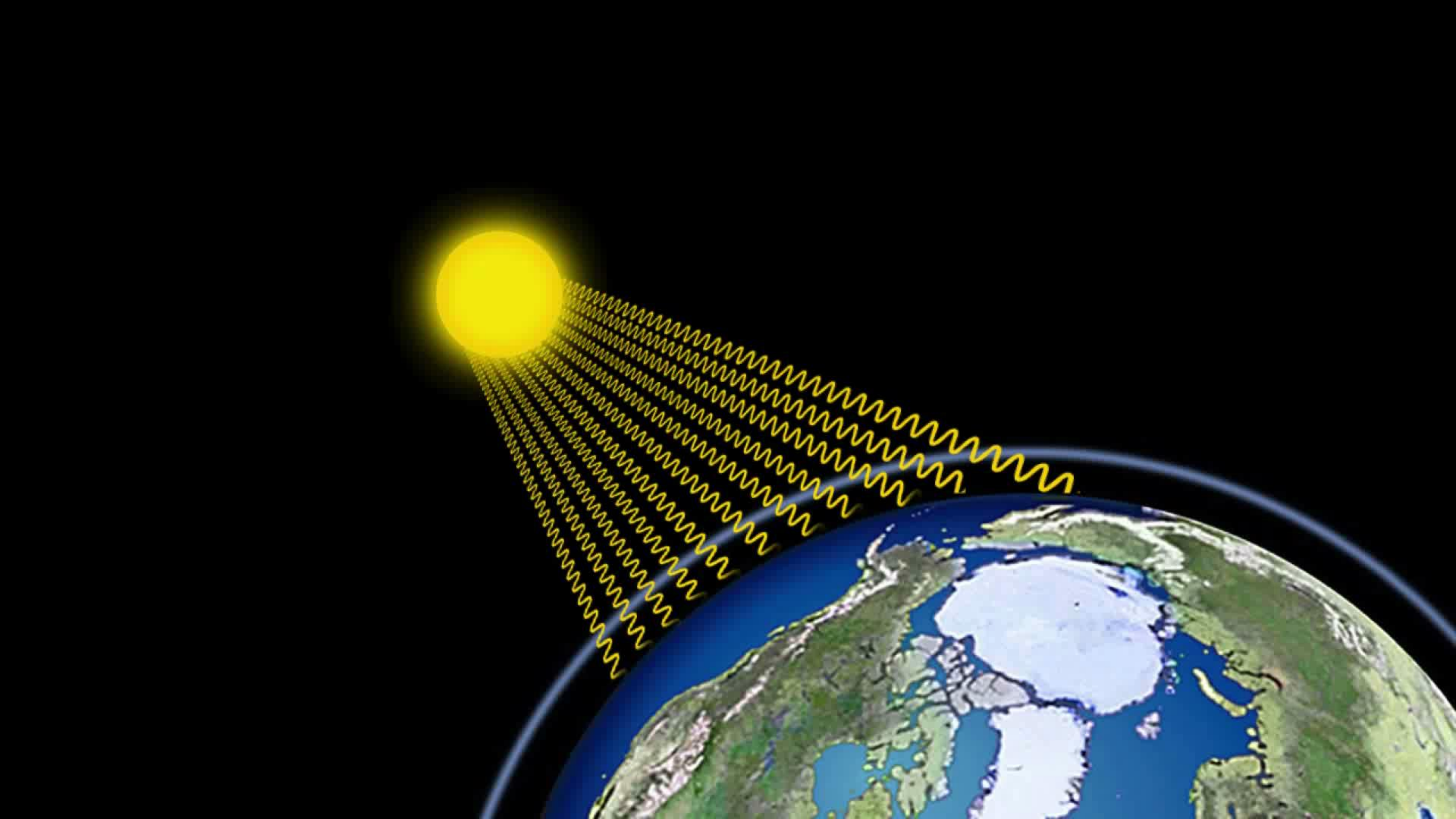
End of 2013

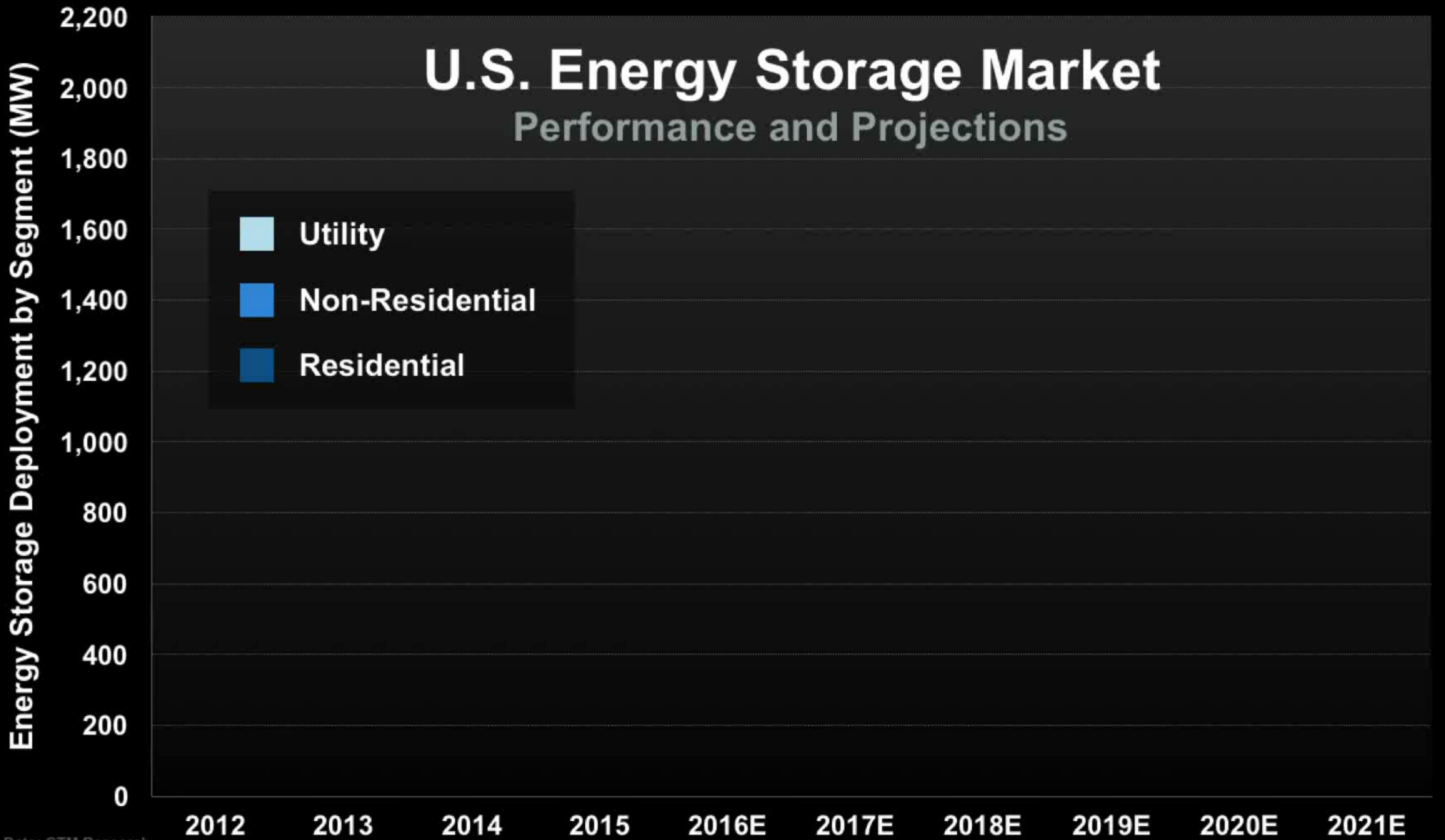
End of 2014

End of 2015

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

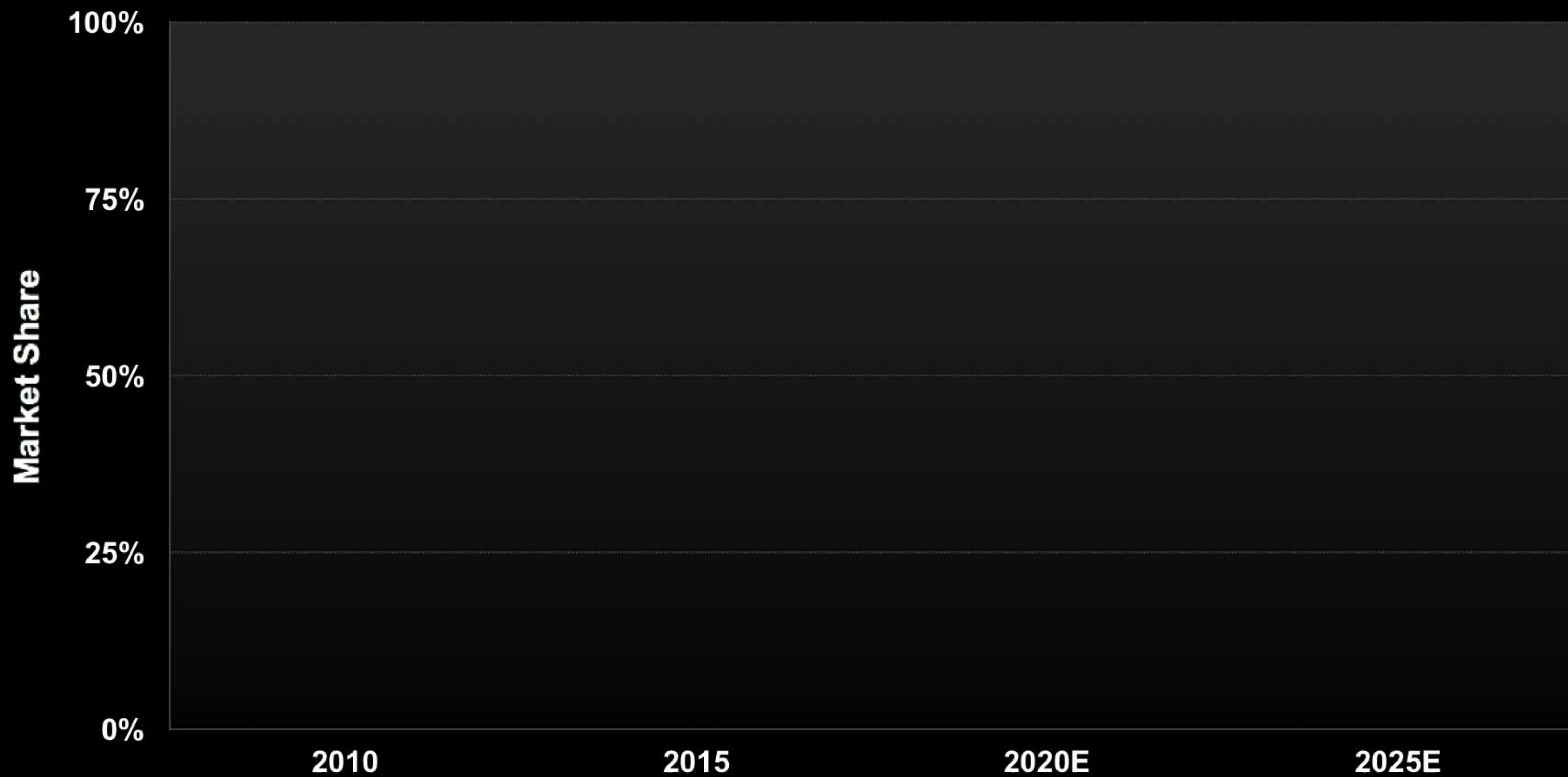








# LED Lights: Percentage of the Total Lighting Market



# **Auto Manufacturers Are Moving to Electric Vehicles**

**Companies with Electric Models in Production**



So...

Can we change?

**3. Will we change?**







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

April 29, 2017









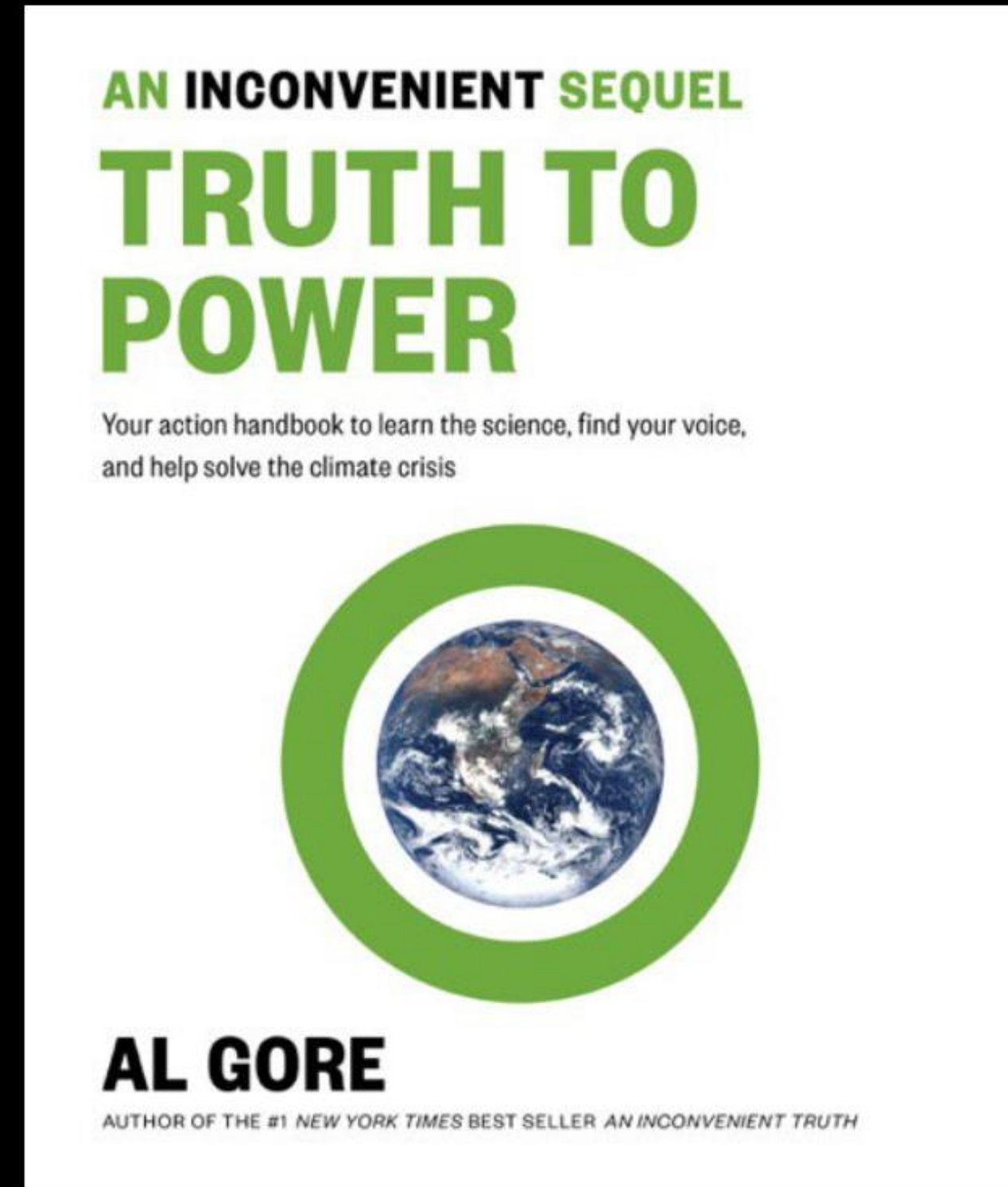
**Your world depends on it.**



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



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