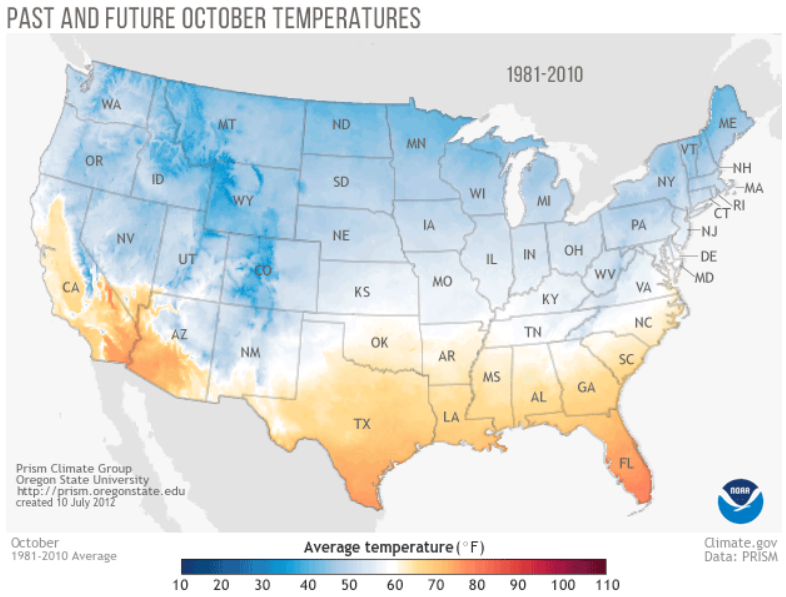
Healthcare Delivery and the Climate Crisis

Emily Senay, MD, MPH
Icahn School of Medicine at Mount Sinai
The FORUM for Medical Affairs, AMA
November 17, 2019



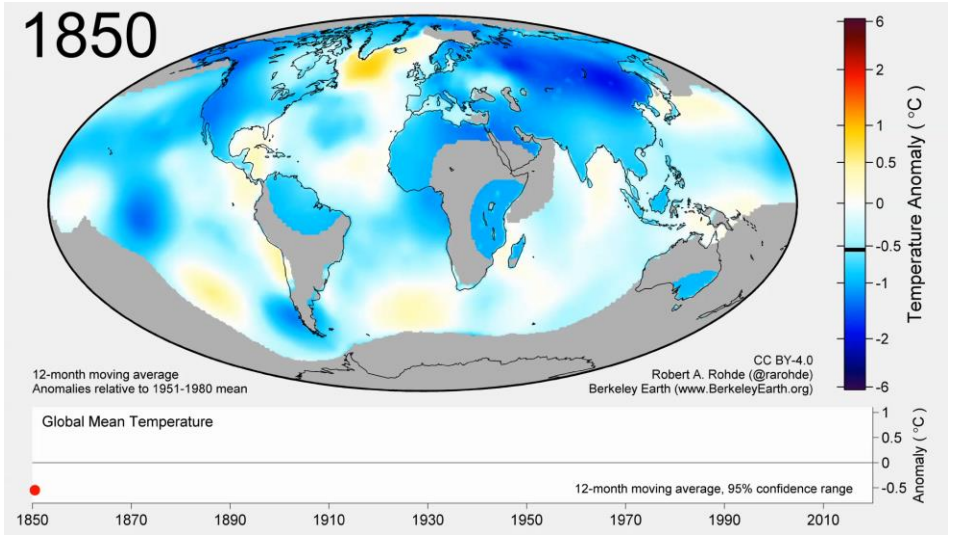
Icahn School of Medicine at Mount Sinai

Disclosure Statement

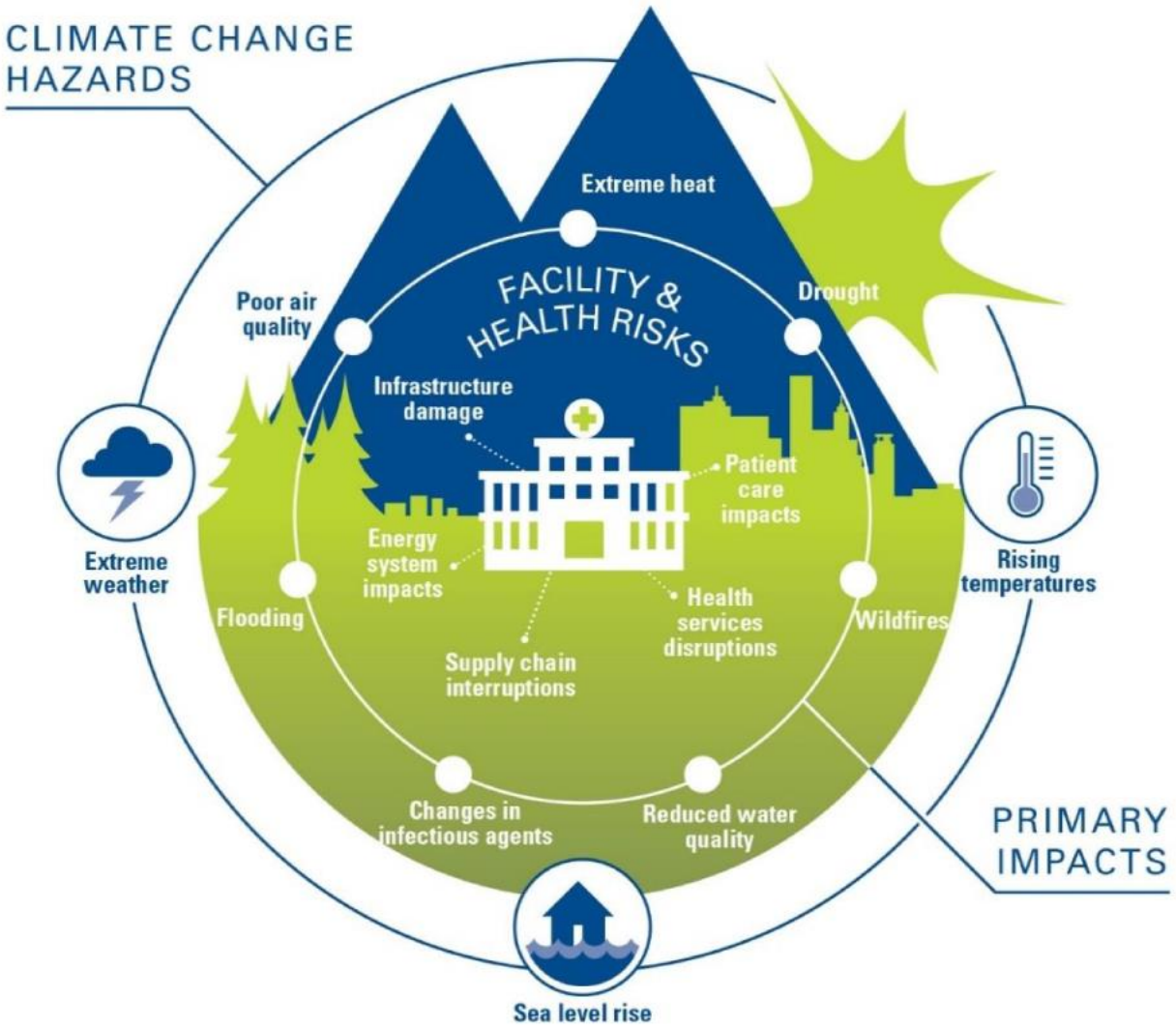
I have no actual or potential conflict of interest in relation to this presentation.

Learning Objectives

- Describe environmental footprint and current sustainability practices of US healthcare delivery system.
- Explain impact of healthcare footprint on patient, population and community health outcomes.
- Detail solutions and strategies to reduce the negative environmental impacts of providing care.



New Climate Reality

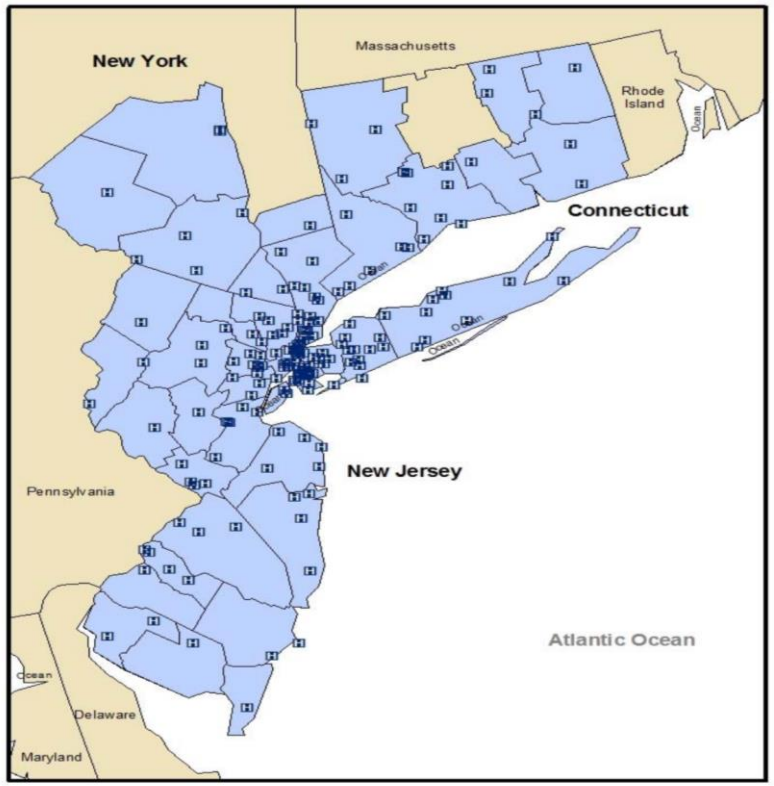


Hurricane Katrina New Orleans 2005

Hurricane Sandy New York, New Jersey 2012

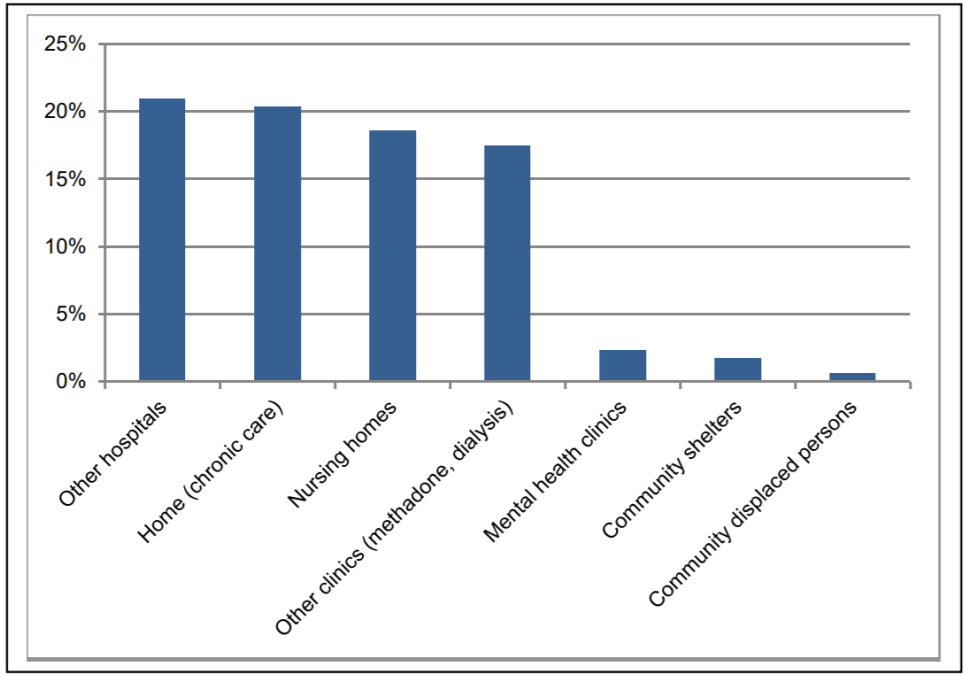
Healthcare facilities in Sandy disaster zone.

Figure A-1: Map of Hospitals Located in Federally Declared Disaster Areas in Connecticut, New Jersey, and New York as a Result of Sandy



Source: OIG analysis of CMS data from Medicare Hospital Compare and CASPER, 2013; and FEMA, FEMA-4085-DR, FEMA-4086-DR, and FEMA-4087-DR. Accessed at http://www.fema.gov on March 4, 2013.

Figure 5: Hospitals With Patient Surge Challenges, by Surge Source, N=172

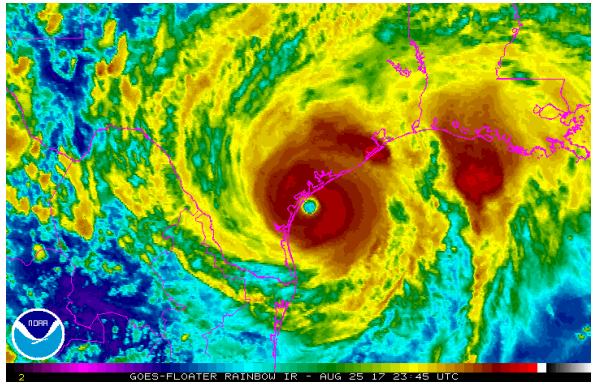


Note: Some hospitals reported experiencing challenges with more than one patient surge source.
Source: OIG analysis of 172 hospital questionnaire responses, 2013.

EF 5 Tornado Joplin, MO 2011

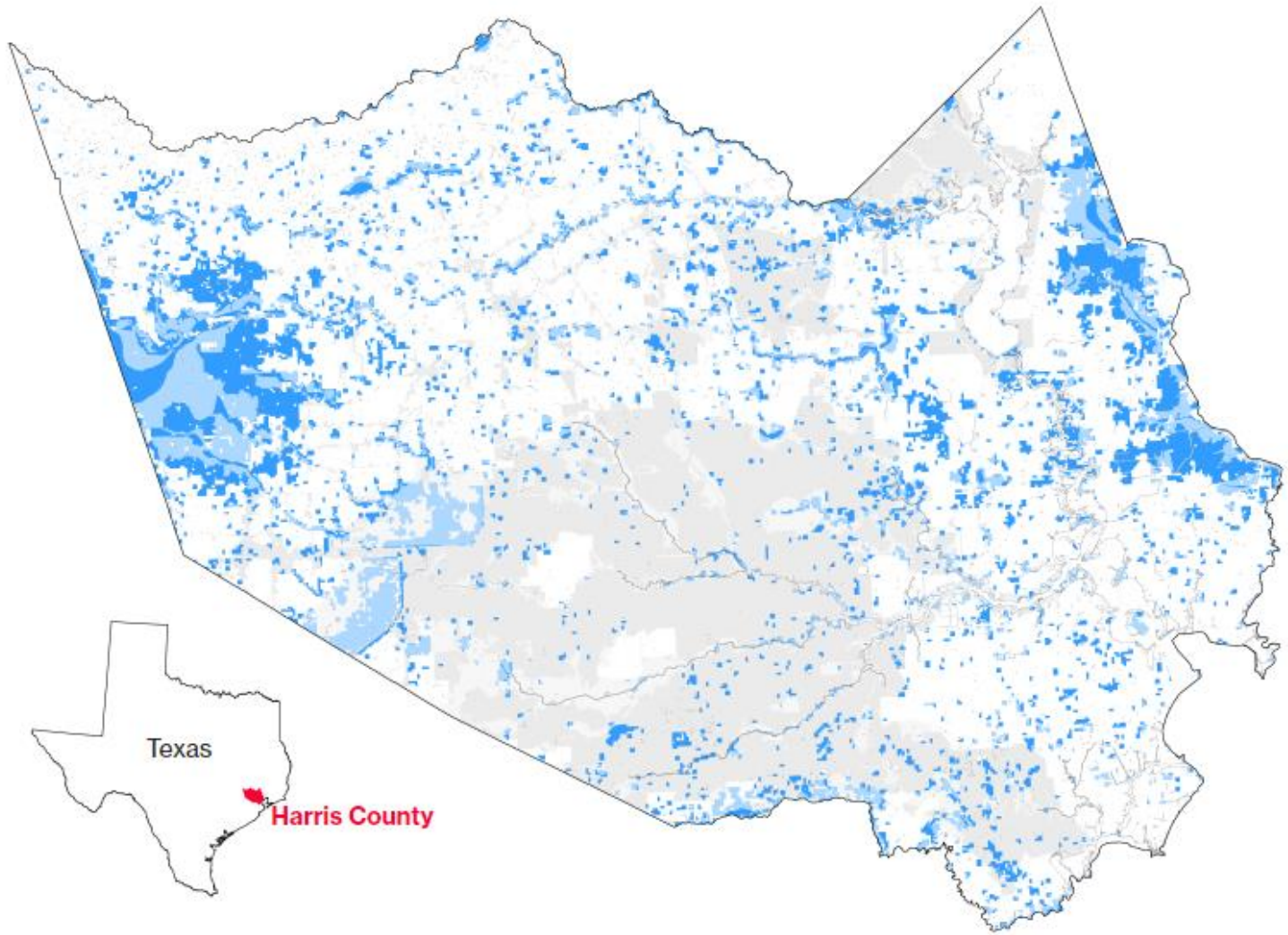
EF 5 Tornado Moore, Oklahoma 2013

Hurricane Harvey Houston, Texas 2017



Harvey flooding outside FEMA's "high-hazard" flood zones

Flooding inside the zone | Flooding outside the zone | Houston city limits



Sources: FEMA, U.S. Census Bureau, Dartmouth Flood Observatory (Maximum Observed Flooding, Hurricane Harvey)
Note: Due to visual obstruction caused by buildings and other factors, observed flooding levels within city limits is limited.

Hurricane Florence 2018 The Carolinas

Camp Fire 2018 Northern California

Bomb Cyclone 2019 North America

Hurricane Irma 2017 Hollywood, Florida

Opinion

When 'Do No Harm' Means Evacuating Hospitals in California

Medical evacuees are the new refugees of climate change.

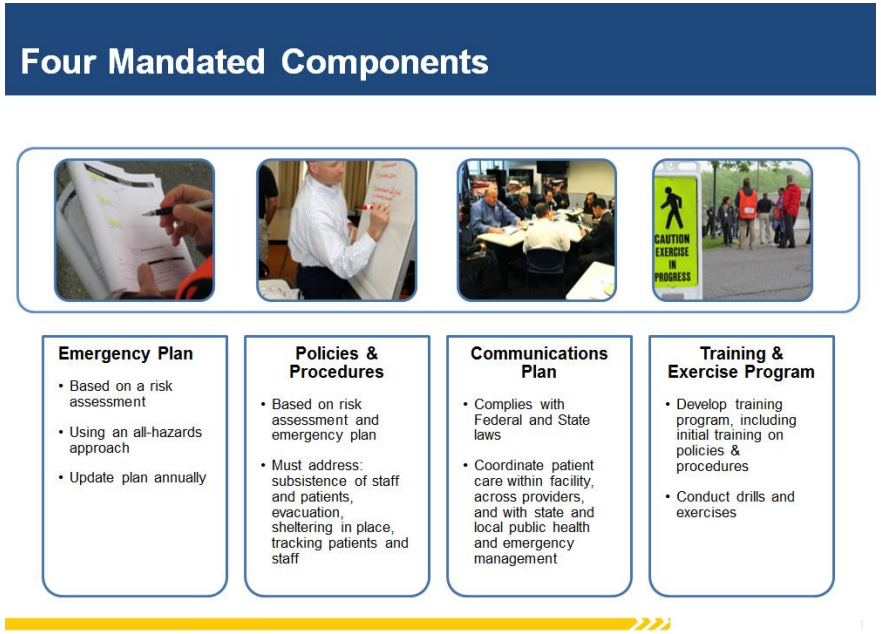
By Stephen Parodi

Dr. Parodi leads emergency management for 21 hospitals in Northern California.

Nov. 1, 2019

Medical personnel evacuated patients from the Feather River Hospital as the Camp Fire raged through Paradise, Calif., in 2018.

CMS Emergency Preparedness Rule 2016



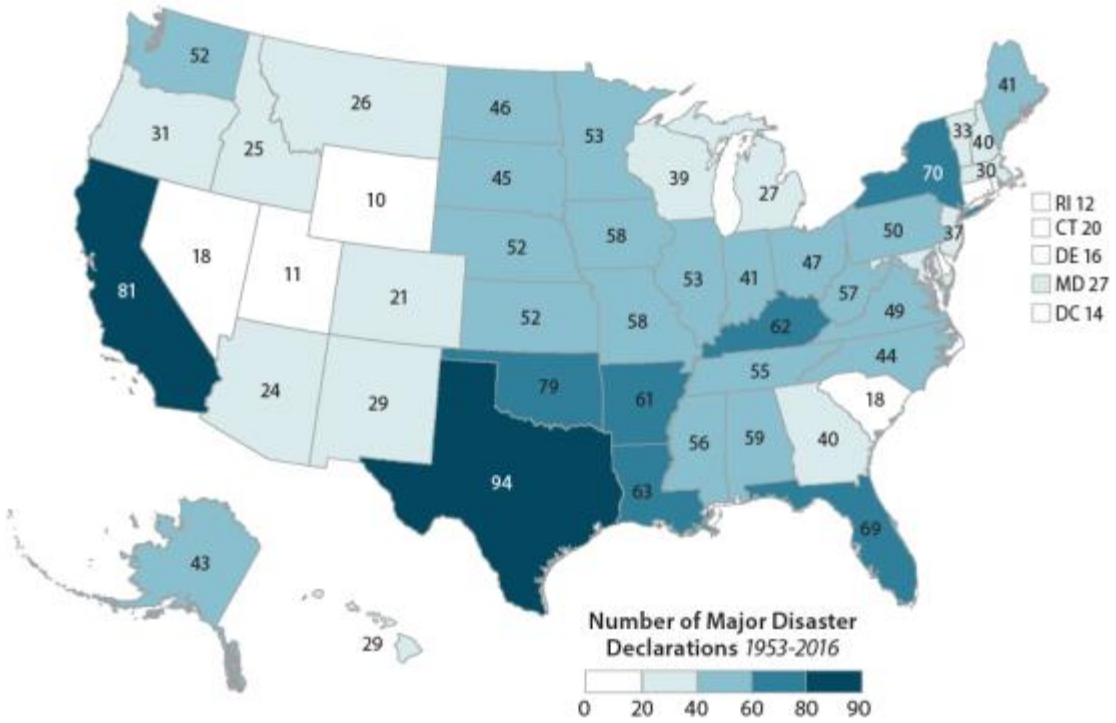
"The "science" of disaster management is spread across more than 900 different multi-disciplinary journals. The existing evidence-base is overwhelmingly descriptive and lacking in objective, post-disaster evaluations."

SmithEC, BurkleFMJr, AitkenP, LeggattP. Seven decades of disasters: a systematic review of the literature. Prehosp Disaster Med. 2018;33(4):418-423

Infrastructure is only as good as weakest link

- No federal requirements for ‘resilience’ as hospitals are locally controlled and licensed.
- No consistent metric for hospital resilience.
- Hospitals can be in complete compliance and totally unprepared.
- “Extreme weather is raising the design threshold and the acceptable baseline for infrastructure integrity and disaster preparedness.”

Declared disasters vs. Climate Disaster Plans



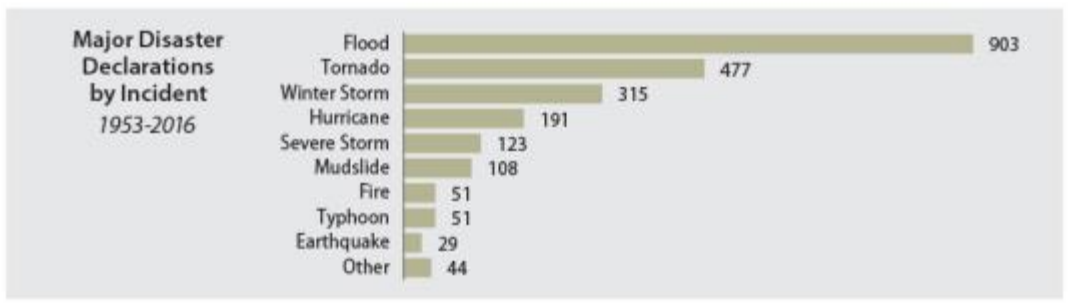
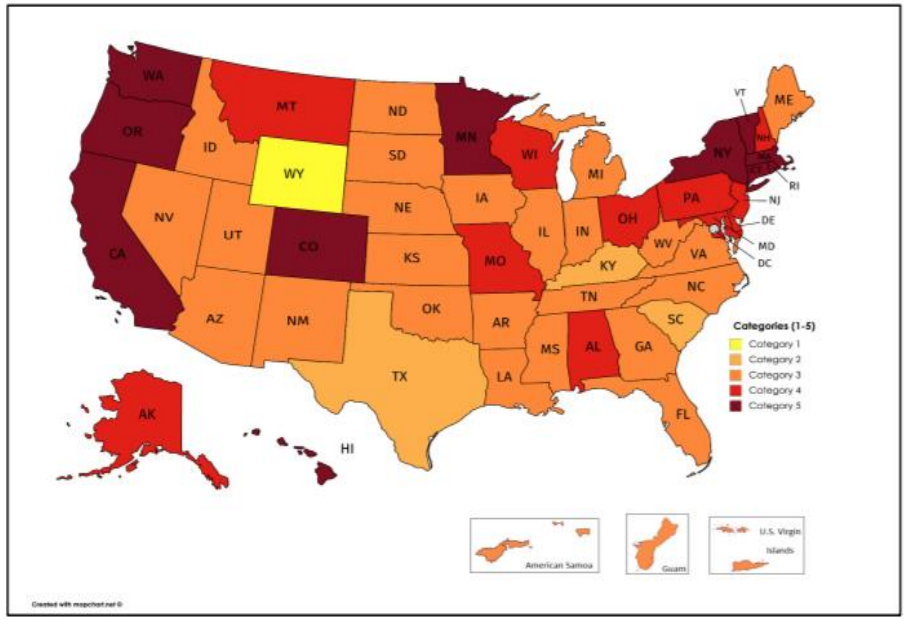
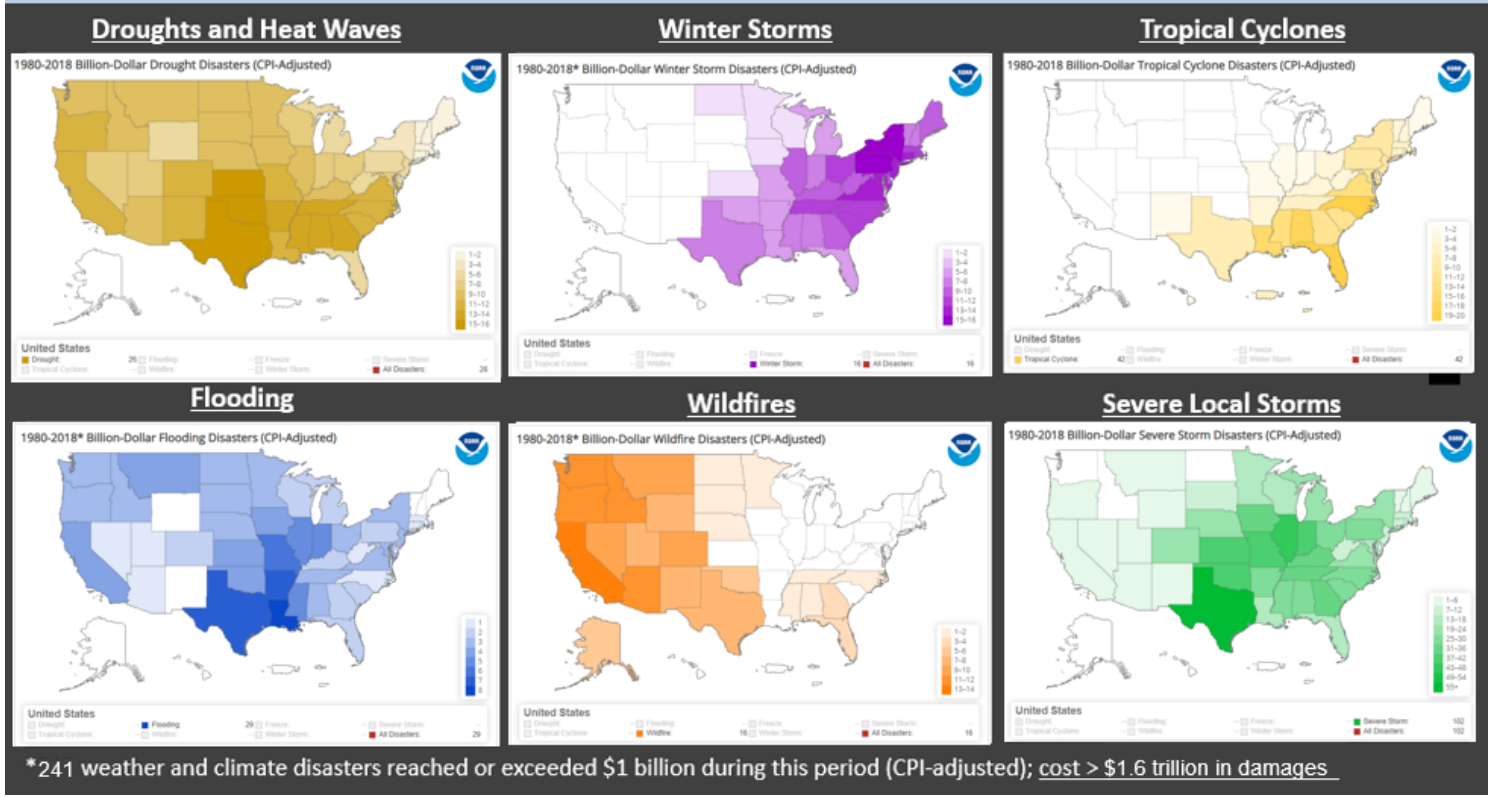


Figure 1: Map of State Hazard Mitigation Plan (SHMP) Climate Change Ranking



The SHMPs are ranked into 5 categories, with "1" indicating SHMPs that did not recognize climate change did so inaccurately and "5" indicating plans with extensive consideration of how climate change will affect hazards, is integrated into planning, and should be mitigated through adaptation actions.

Billion-dollar weather and climate disasters frequency mapping: 1980-2018*



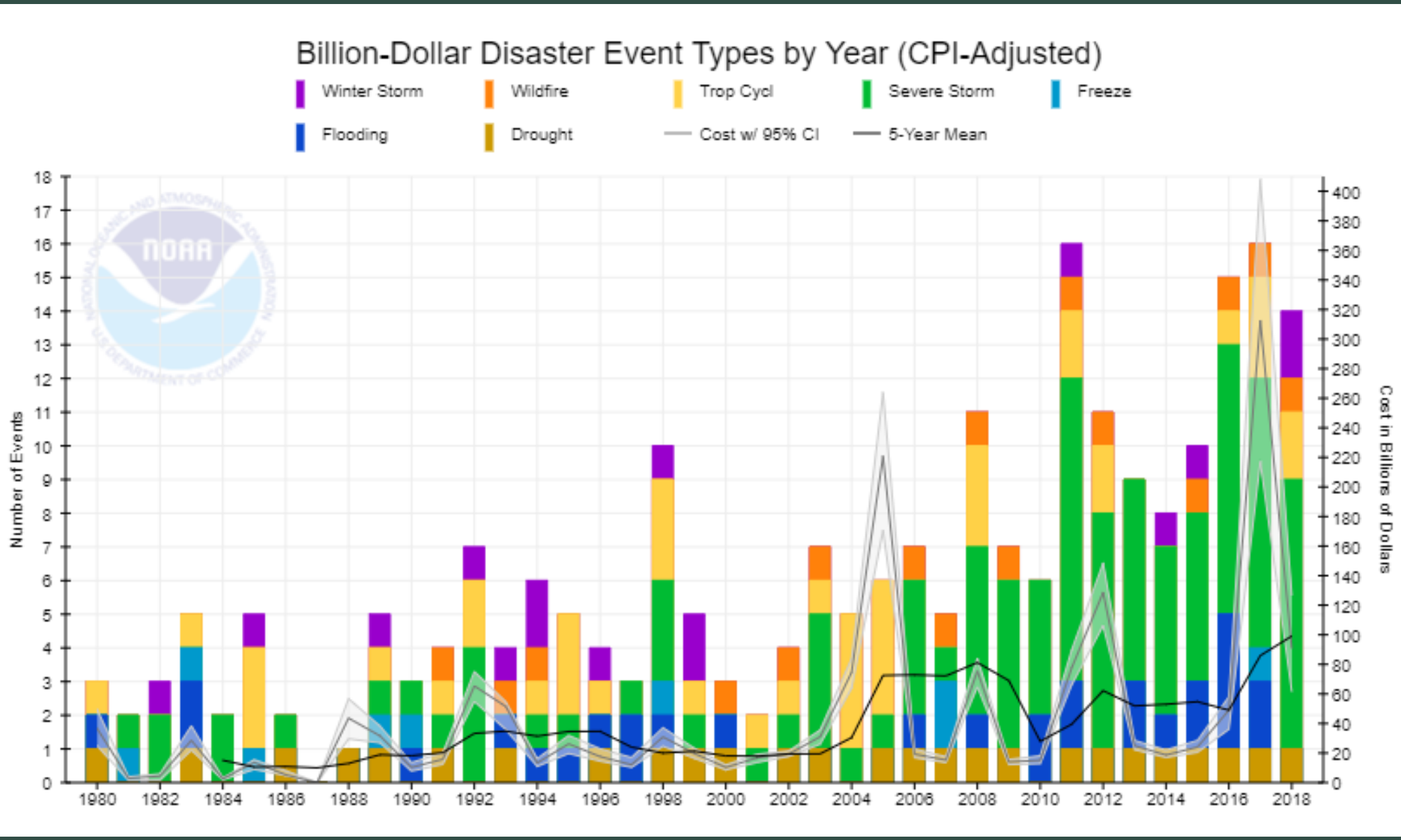
*241 weather and climate disasters reached or exceeded $1 billion during this period (CPI-adjusted); cost > $1.6 trillion in damages

Are we really seeing more extreme events, or does it just feel like it?

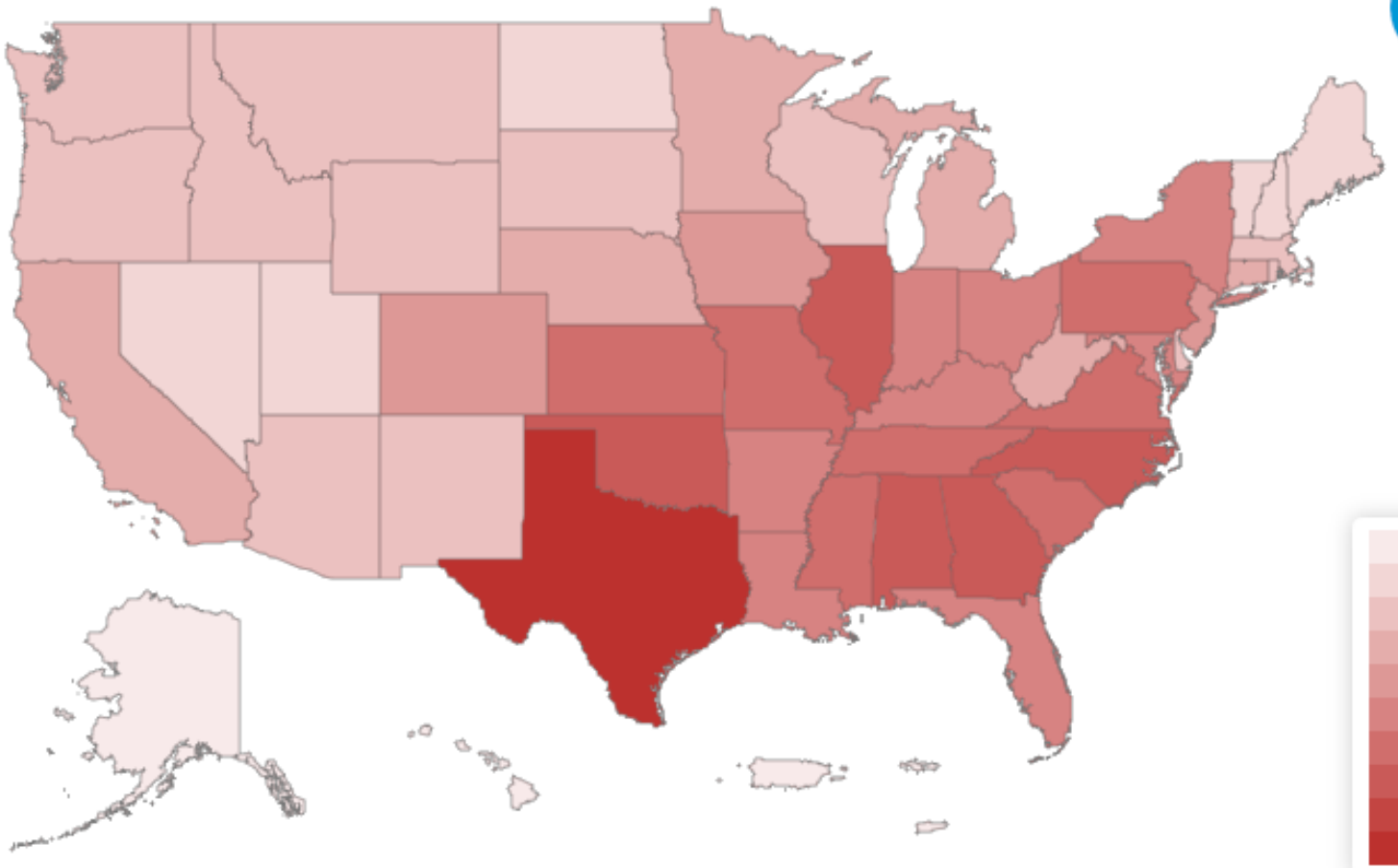
Typical year in US.

- *10,000 severe thunderstorms*
- *5,000 floods*
- *1,000 tornadoes*
- *10 hurricanes*
- *12,000 temperature related hospitalizations*

- *Every state in the country has been impacted by at least one billion-dollar disaster since 1980*


Billion-Dollar Disaster Event Types by Year (CPI-Adjusted)
Winter Storm
Wildfire
Trop Cycl
Severe Storm
Freeze
Flooding
Drought
Cost w/ 95% CI
5-Year Mean
Number of Events
Cost in Billions of Dollars
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

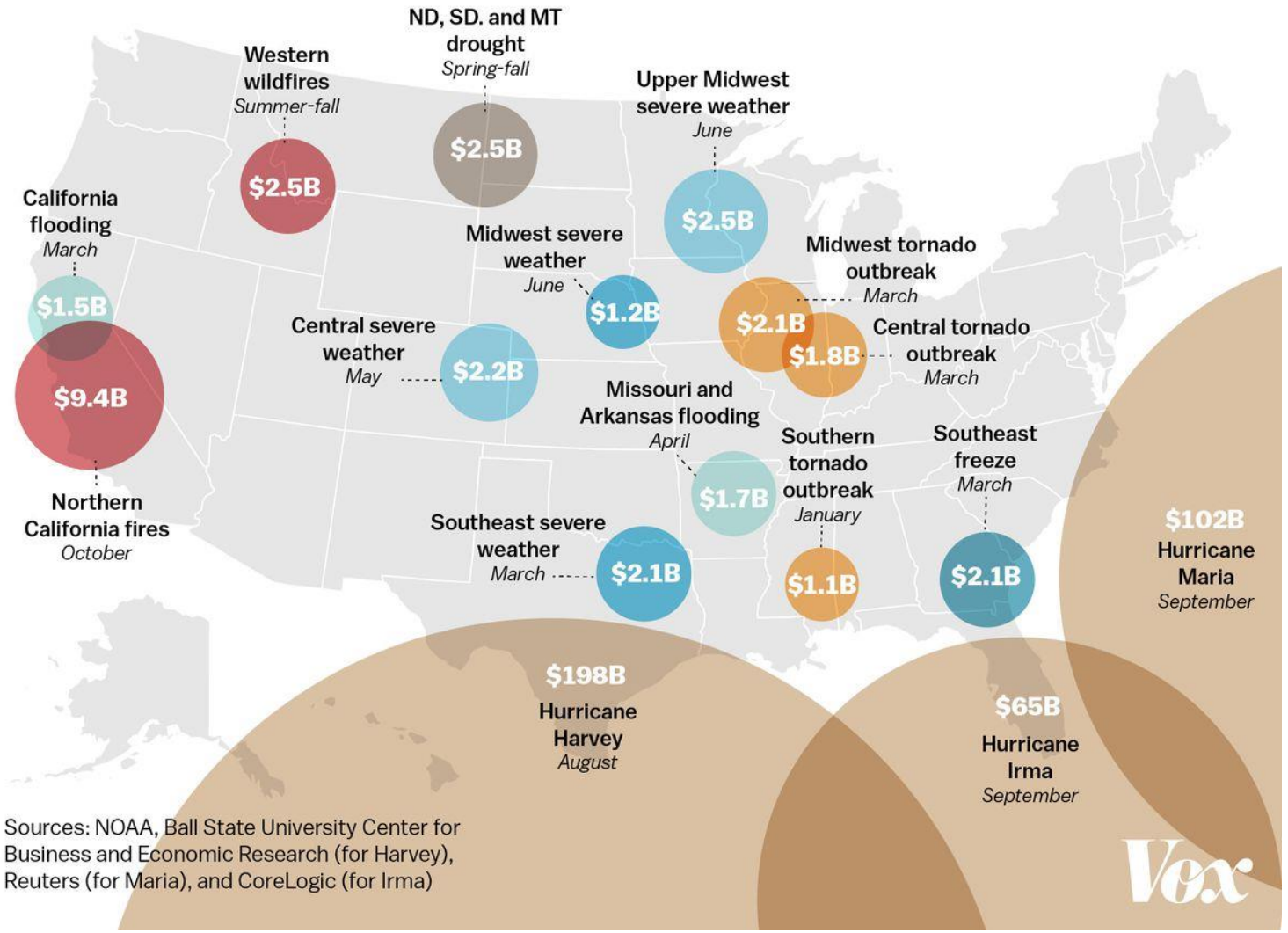
1980-2018 Billion-Dollar Weather and Climate Disasters (CPI-Adjusted)



United States

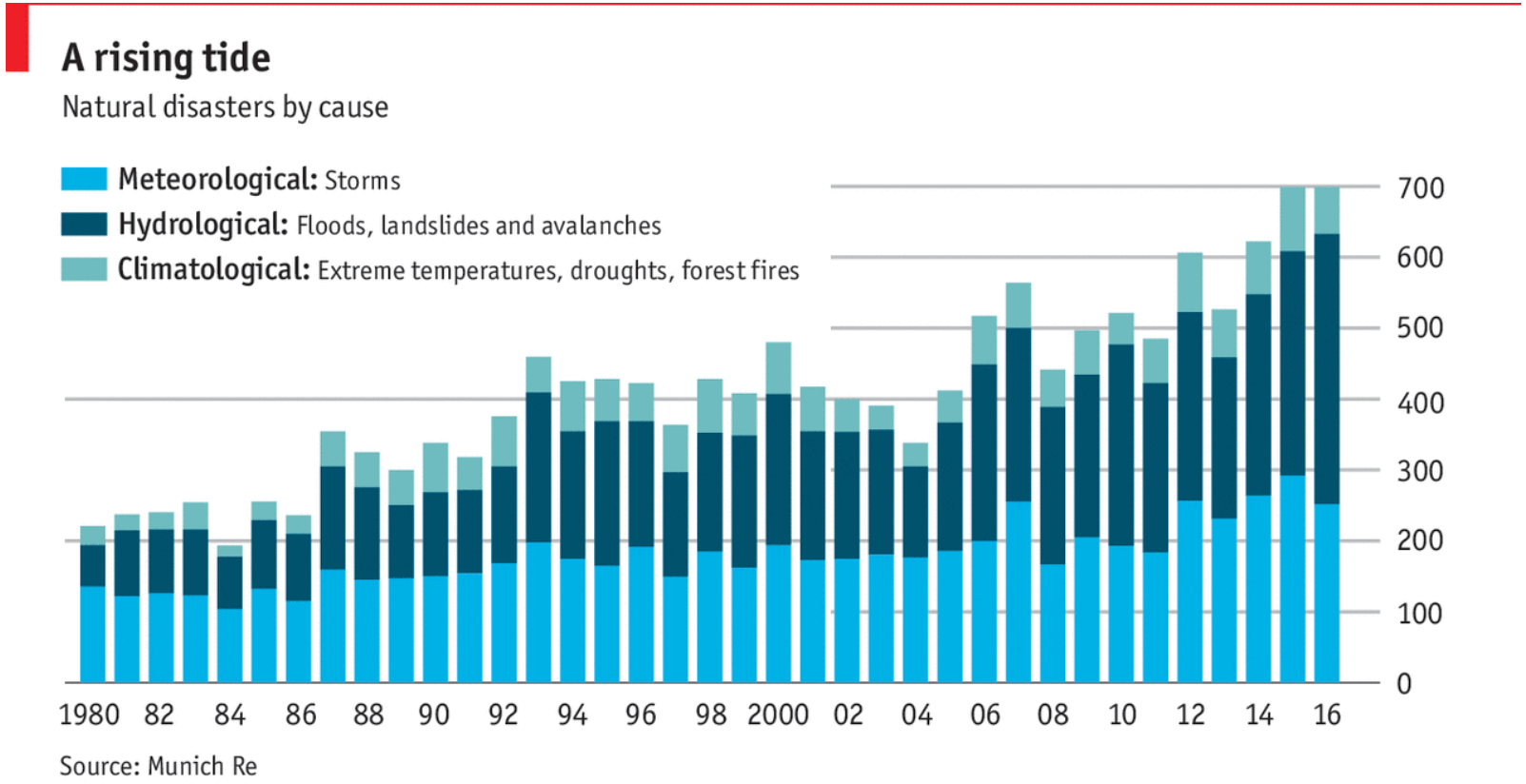
Drought:	26	Flooding:	29	Freeze:	9	Severe Storm:	103
Tropical Cyclone:	42	Wildfire:	16	Winter Storm:	16	All Disasters:	241

Billion-dollar disasters of 2017 in the US

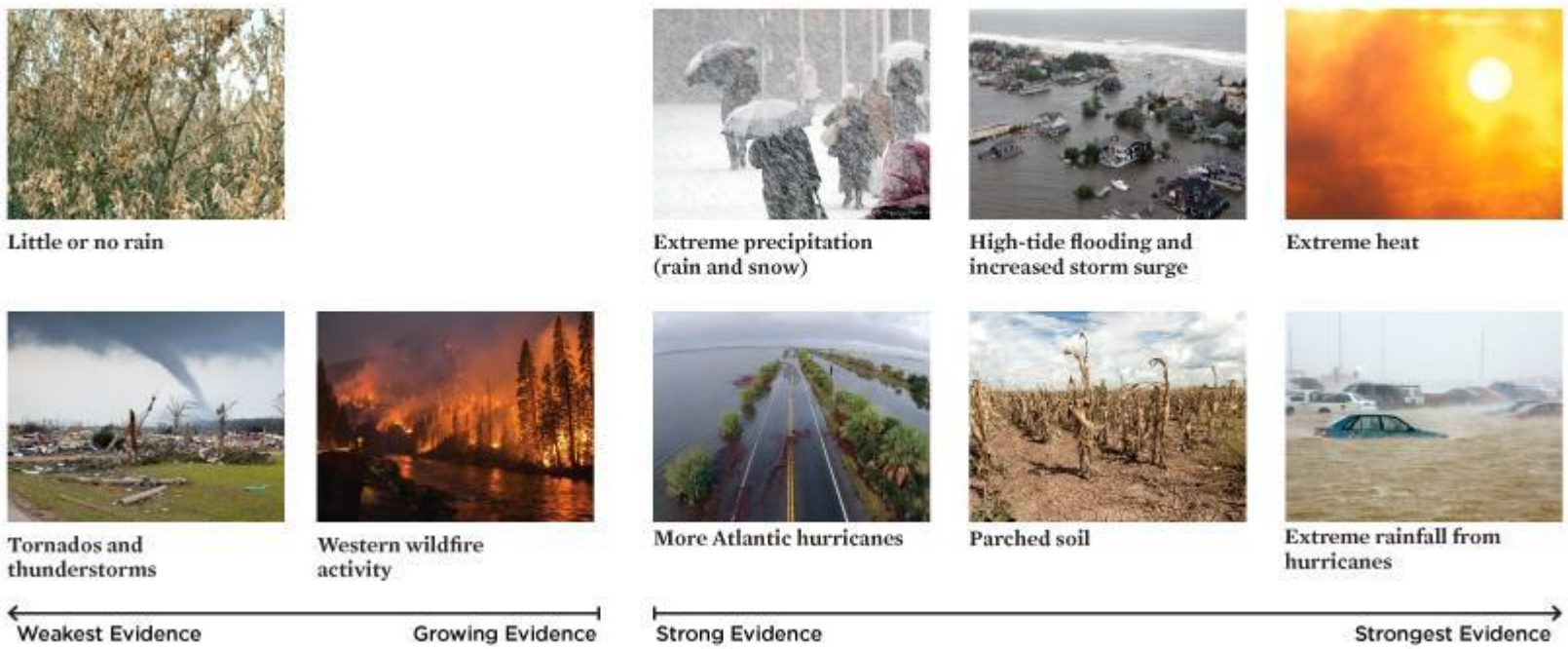


Sources: NOAA, Ball State University Center for Business and Economic Research (for Harvey), Reuters (for Maria), and CoreLogic (for Irma)

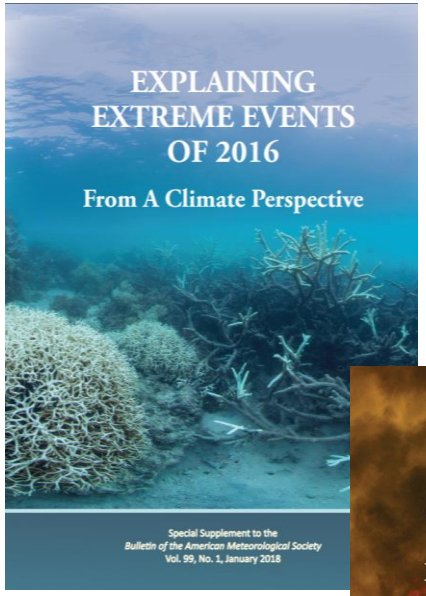
Smaller hydrological events



Attribution science: The connection between extreme weather and climate change.



American Meteorological Society: Explaining Extreme Events 2016 & 2017



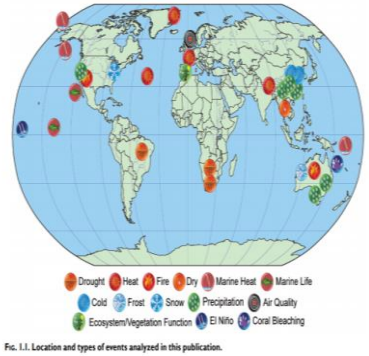
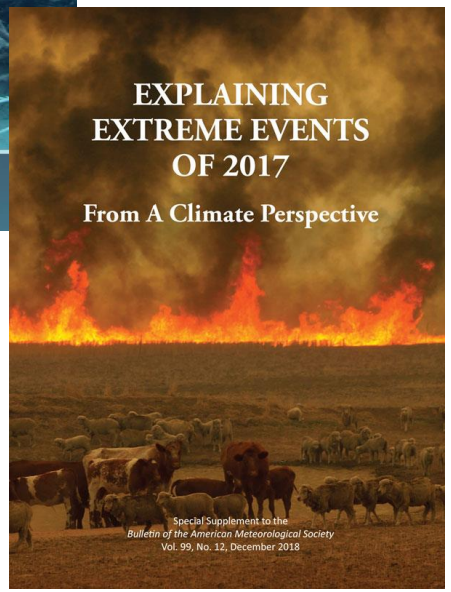


Fig. 1.1. Location and types of events analyzed in this publication.



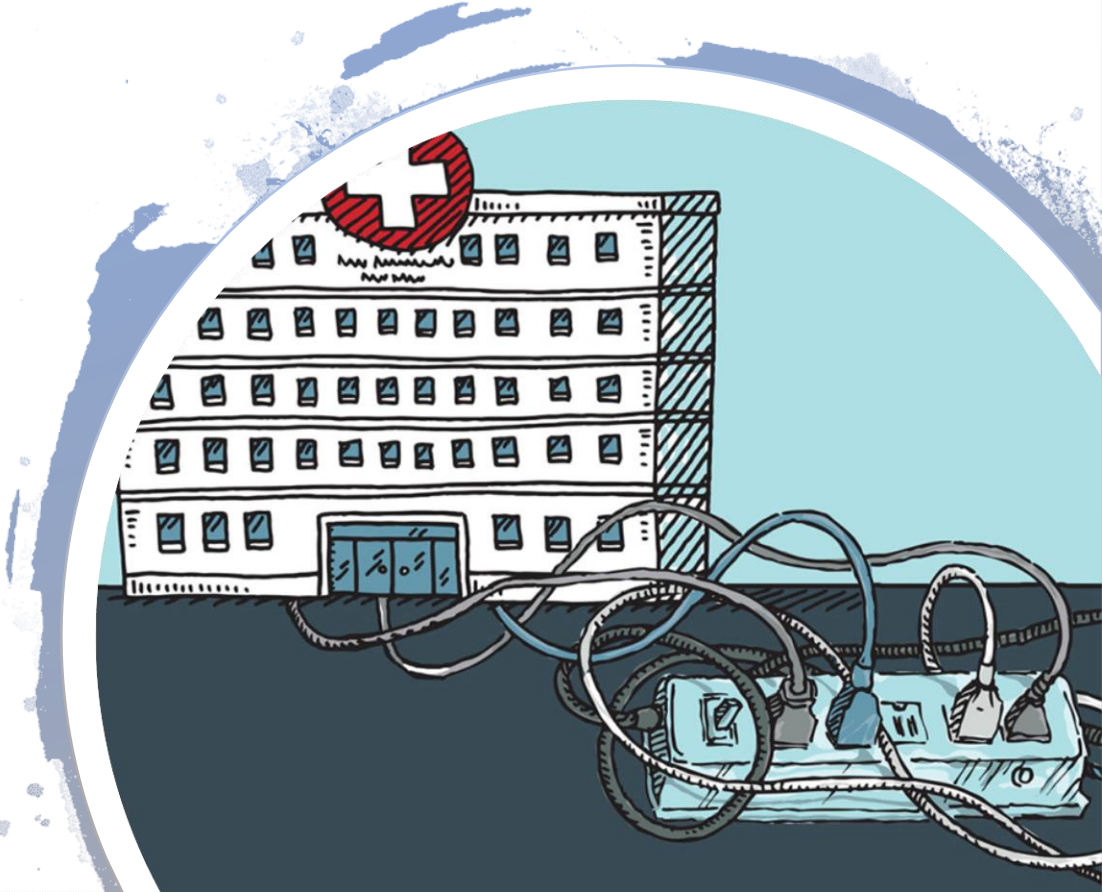
- In 2016, first time 3 events identified that would not have been possible in preindustrial times without climate change.
  - Other events were made more severe by climate change.
- 2017 intense heatwaves in sea near Australia impossible without man-made climate change.

How does healthcare delivery contribute to the climate crisis?

Healthcare facilities are energy, water and resource intensive.

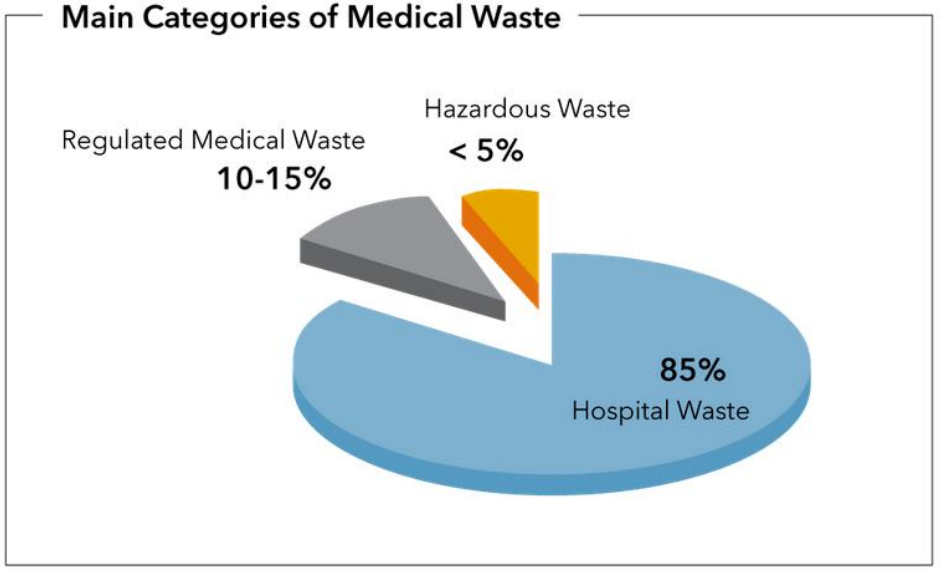
Hospitals 2.5 times energy intensity of equal size commercial building.

Inpatient facilities use more water than any other commercial building type.



Hospital waste

- Majority of materials procured by hospitals become waste.
- 6 million tons annually
- 80-85% is benign can be recycled or composted
- 25% is plastic
    - 1 pound of product = 32 pounds waste created during manufacturing/transportation.



Hospitals are top consumers of chemicals

- 15–20% Hazardous/regulated medical waste
- No good method of disposal
- ENVIRONMENTAL POLLUTION contaminating air, soil, water.

Healthcare gases are GHG

Anesthetic Gases

- 5% total hospital GHG emissions.

Metered Dose Inhalers

Inhalers

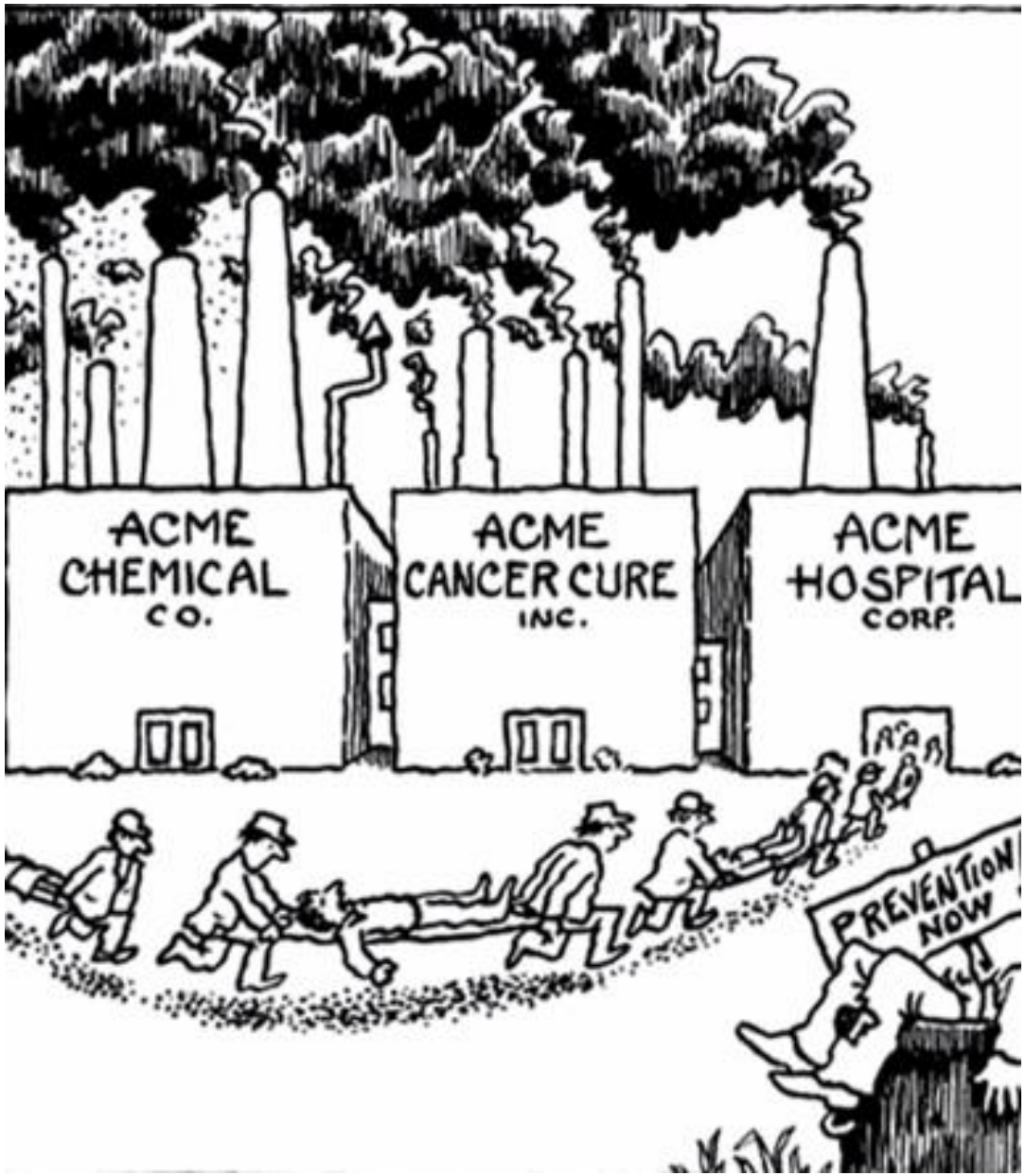
Ventolin (100mcg) 200 dose Evohaler
29kg CO_2e per pack
144g CO_2e per actuation

Ventolin (200mcg) 60 Dose Accuhaler
0.8kg CO_2e per pack
13g CO_2e per actuation

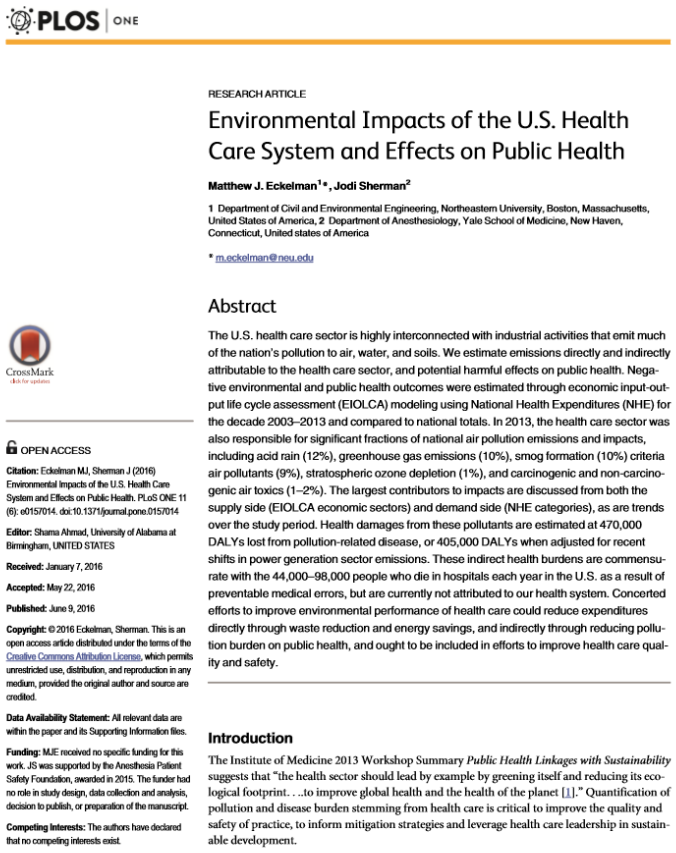
- Per actuation, MDI emissions are **11x** DPI emissions
- The propellant HFA134a contributes >99% of the carbon footprint of the Evohaler (MDI)
- For a 200 dose Ventolin Evohaler, 88% GHG are released on inhaler use, the rest in manufacture

Source: GSK, by personal communication

How much of an environmental burden is healthcare delivery?



Non-GHG emissions linked to U.S. healthcare



PLOS ONE

RESEARCH ARTICLE

Environmental Impacts of the U.S. Health Care System and Effects on Public Health

Matthew J. Eckelman[1]*, Jodi Sherman[2]

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Abstract

The U.S. health care sector is highly interconnected with industrial activities that emit much of the nation's pollution to air, water, and soils. We estimate emissions directly and indirectly attributable to the health care sector, and potential harmful effects on public health. Negative environmental and public health outcomes were estimated through economic input-output life cycle assessment (EIOLCA) modeling using National Health Expenditures (NHE) for the decade 2003–2013 and compared to national totals. In 2013, the health care sector was also responsible for significant fractions of national air pollution emissions and impacts, including acid rain (12%), greenhouse gas emissions (10%), smog formation (10%) criteria air pollutants (9%), stratospheric ozone depletion (1%), and carcinogenic and non-carcinogenic air toxics (1–2%). The largest contributors to impacts are discussed from both the supply side (EIOLCA economic sectors) and demand side (NHE categories), as are trends over the study period. Health damages from these pollutants are estimated at 470,000 DALYs lost from pollution-related disease, or 405,000 DALYs when adjusted for recent shifts in power generation sector emissions. These indirect health burdens are commensurate with the 44,000–98,000 people who die in hospitals each year in the U.S. as a result of preventable medical errors, but are currently not attributed to our health system. Concerted efforts to improve environmental performance of health care could reduce expenditures directly through waste reduction and energy savings, and indirectly through reducing pollution burden on public health, and ought to be included in efforts to improve health care quality and safety.

OPEN ACCESS

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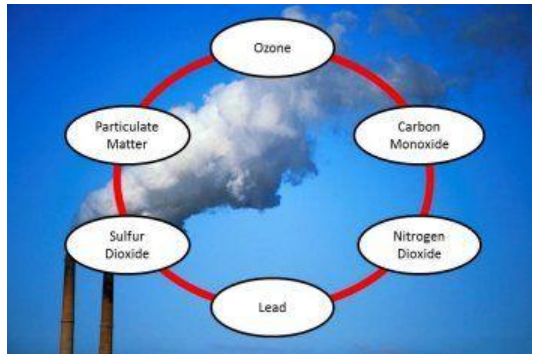
Competing Interests: The authors have declared that no competing interests exist.

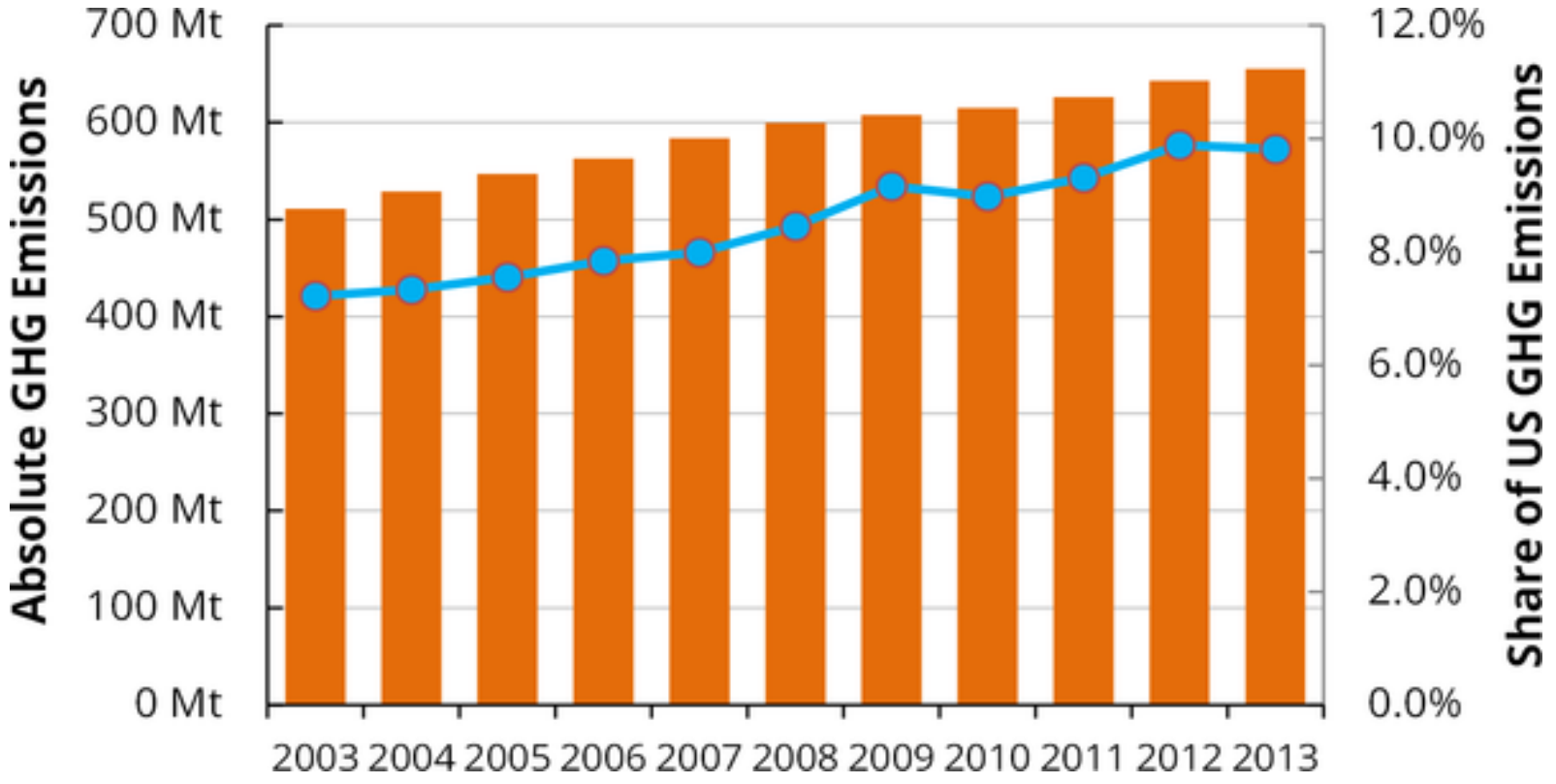
Introduction

The Institute of Medicine 2013 Workshop Summary *Public Health Linkages with Sustainability* suggests that "the health sector should lead by example by greening itself and reducing its ecological footprint. . ..to improve global health and the health of the planet [1]." Quantification of pollution and disease burden stemming from health care is critical to improve the quality and safety of practice, to inform mitigation strategies and leverage health care leadership in sustainable development.

- 12% acid rain
- 10% smog
- 9% criteria air pollutants
- 1% ozone depletion
- 1% air toxics



US healthcare system GHG emissions



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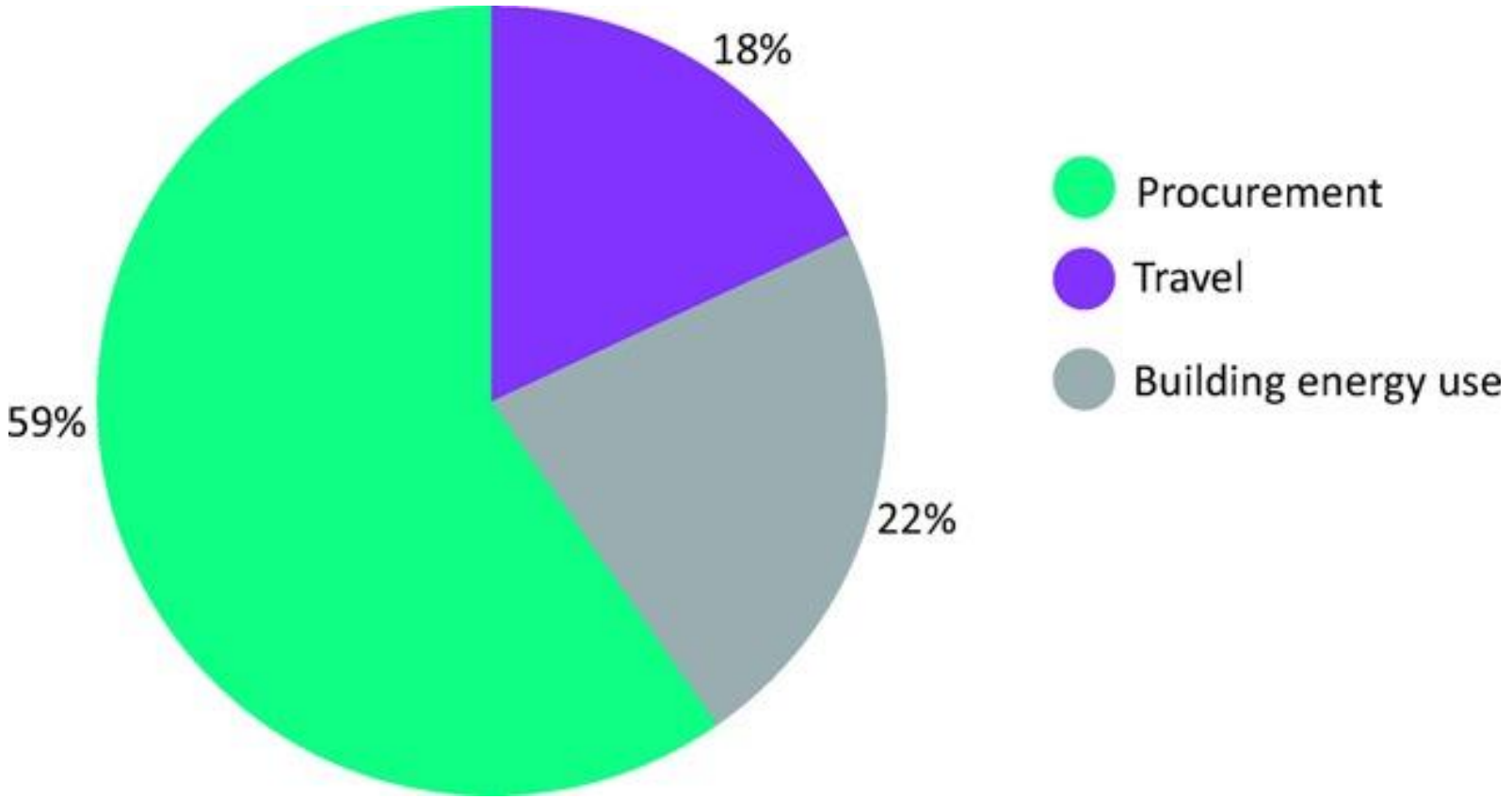
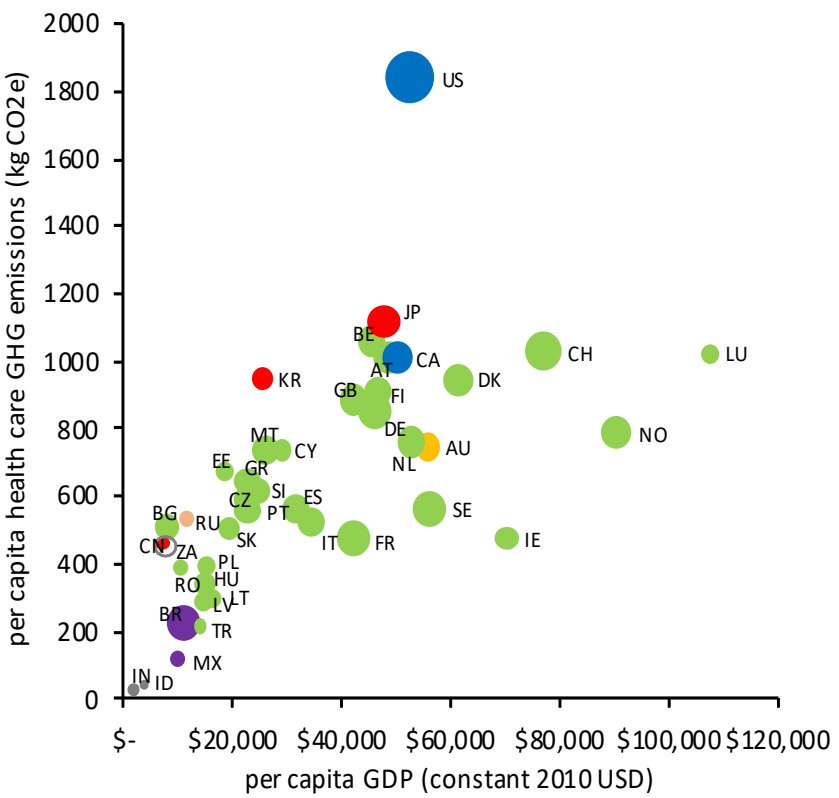
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0157014

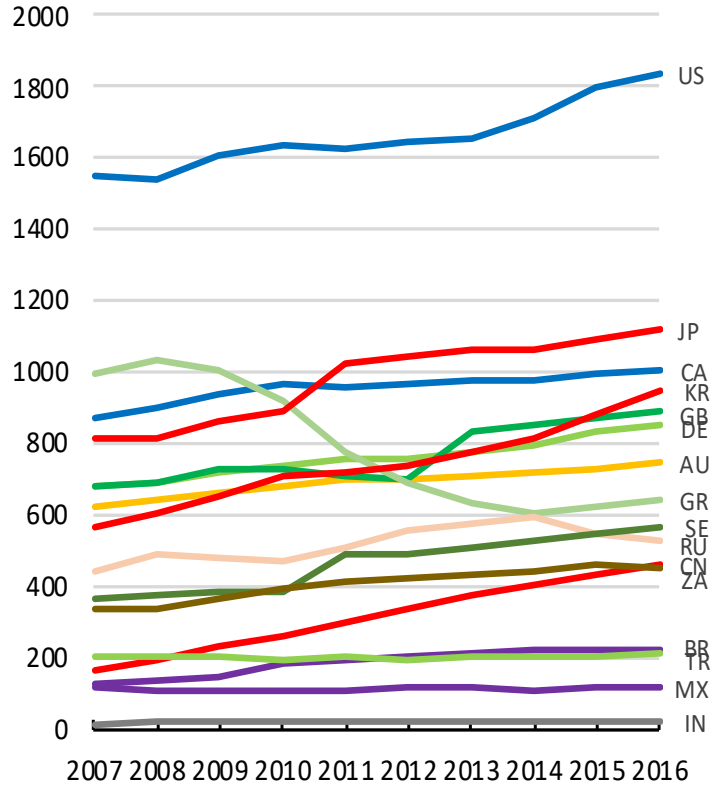
The U.S. healthcare sector emits more GHG than the entire United Kingdom.

Healthcare GHG sources



Global healthcare sector GHG emissions 4.6% of global total emissions (2250 Mt CO2e) in 2016





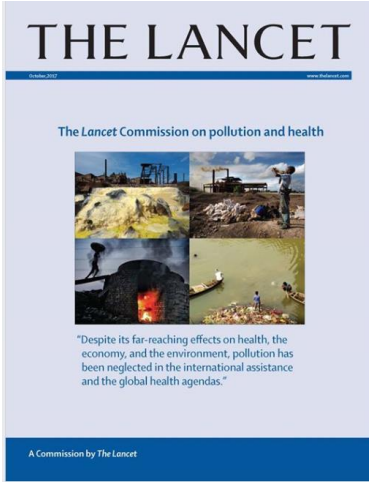
Watts, et al., Lancet Vol 394 Nov 16, 2019

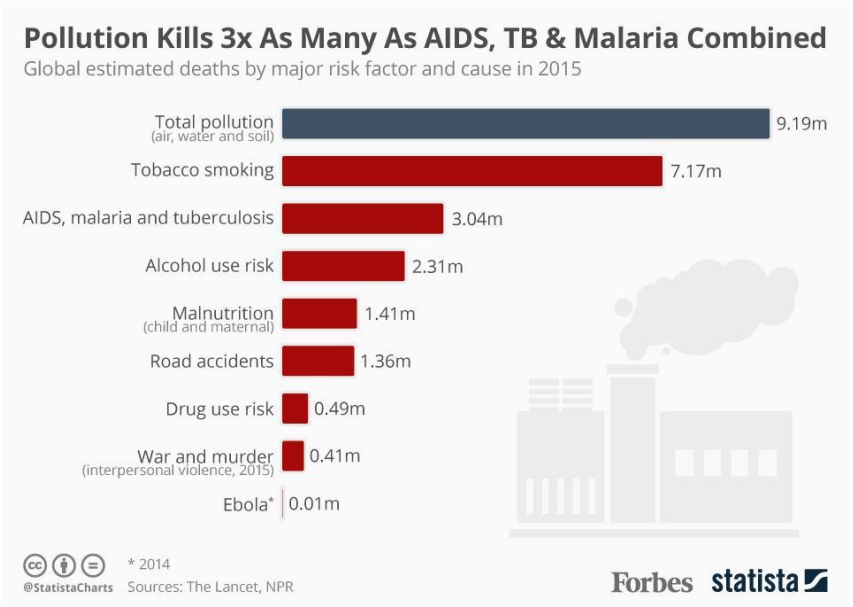
How does healthcare pollution effect health?

Lancet Commission on pollution and health

Pollution is a leading cause of morbidity and mortality worldwide.

- Annual premature deaths globally
  - 9 million total
  - 6.4 million to air pollution





Healthcare air pollution

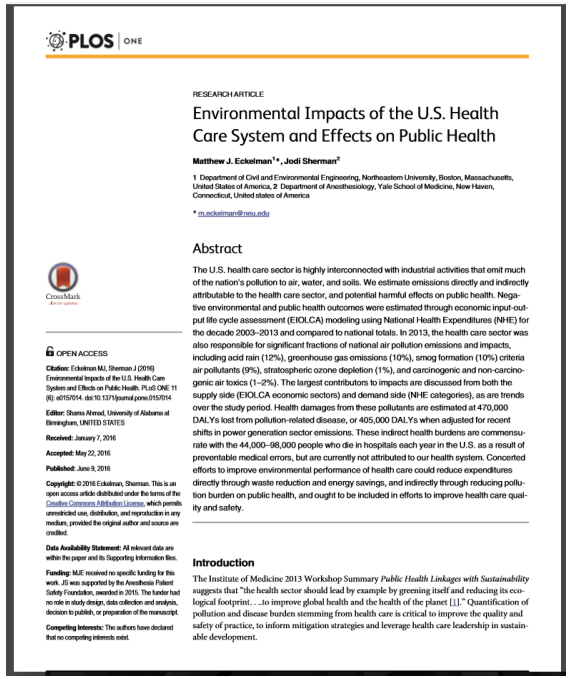
- Air pollution
  - 107,000 American deaths
  - $886 billion healthcare costs
- $C0_2$ emissions are a proxy for air pollution
- 10% can be linked to healthcare

-2018 PNAS

Harm from healthcare pollution.

GHG and non-GHG combined

614,000 DALYs LOST



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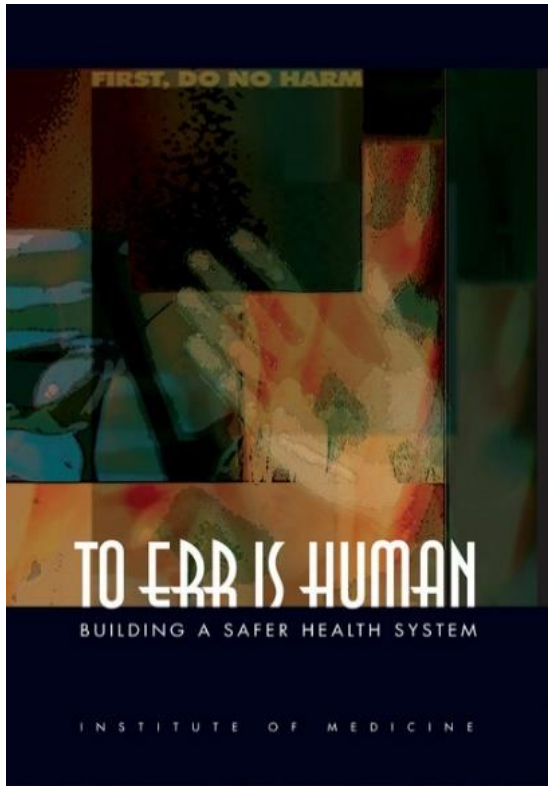
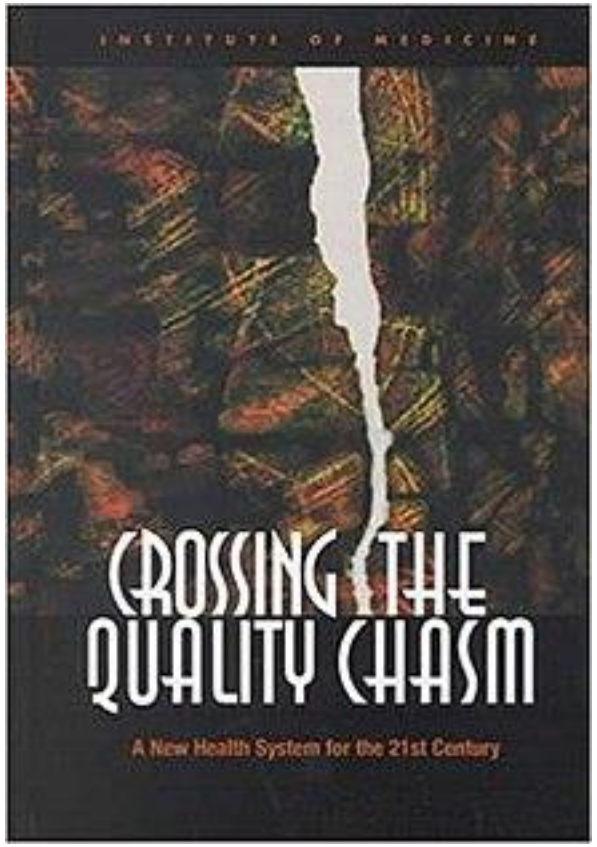
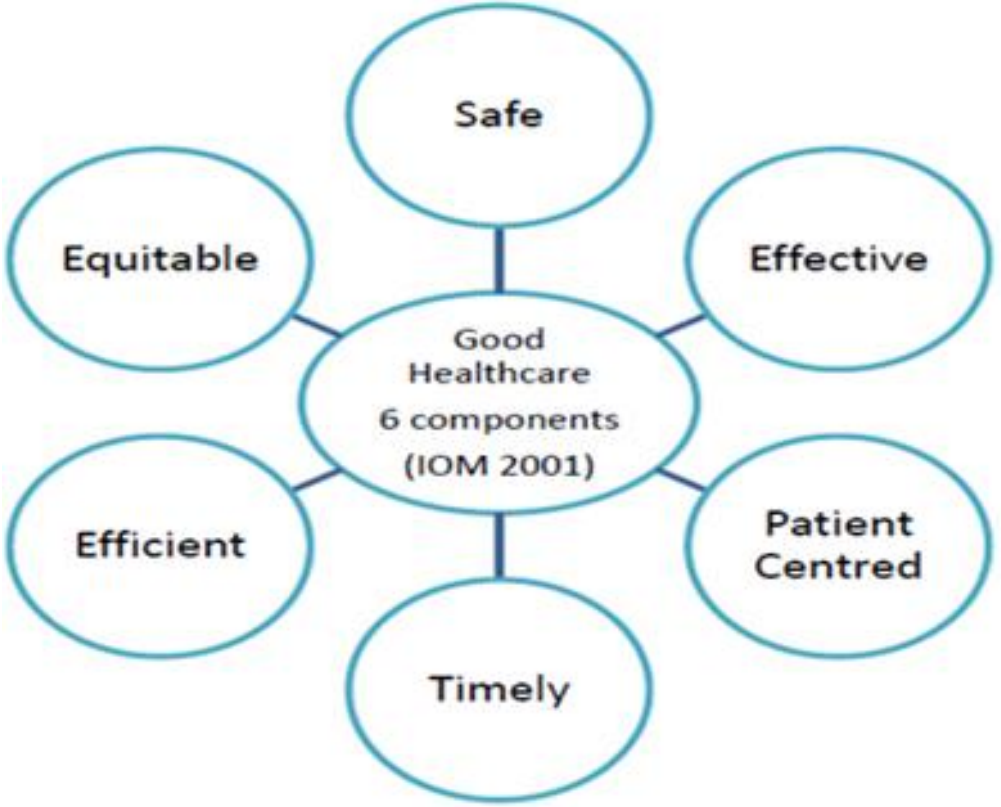


44,000 to 98,000 lives lost each year to preventable medical errors

Healthcare pollution is a patient safety issue.

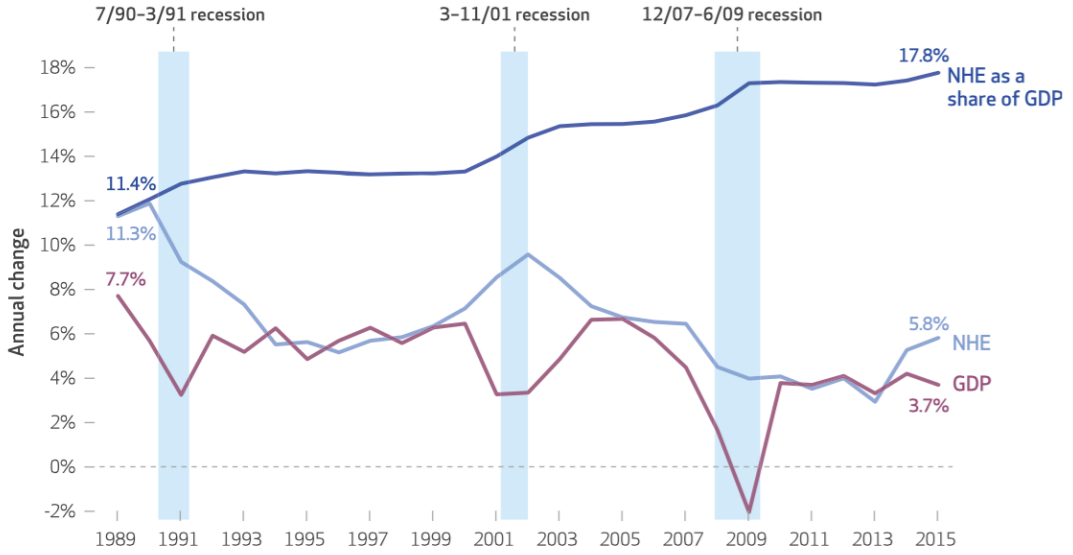




Healthcare: Big Business

EXHIBIT 2

Growth in national health expenditures (NHE) and gross domestic product (GDP), and NHE as a share of GDP, 1989–2015



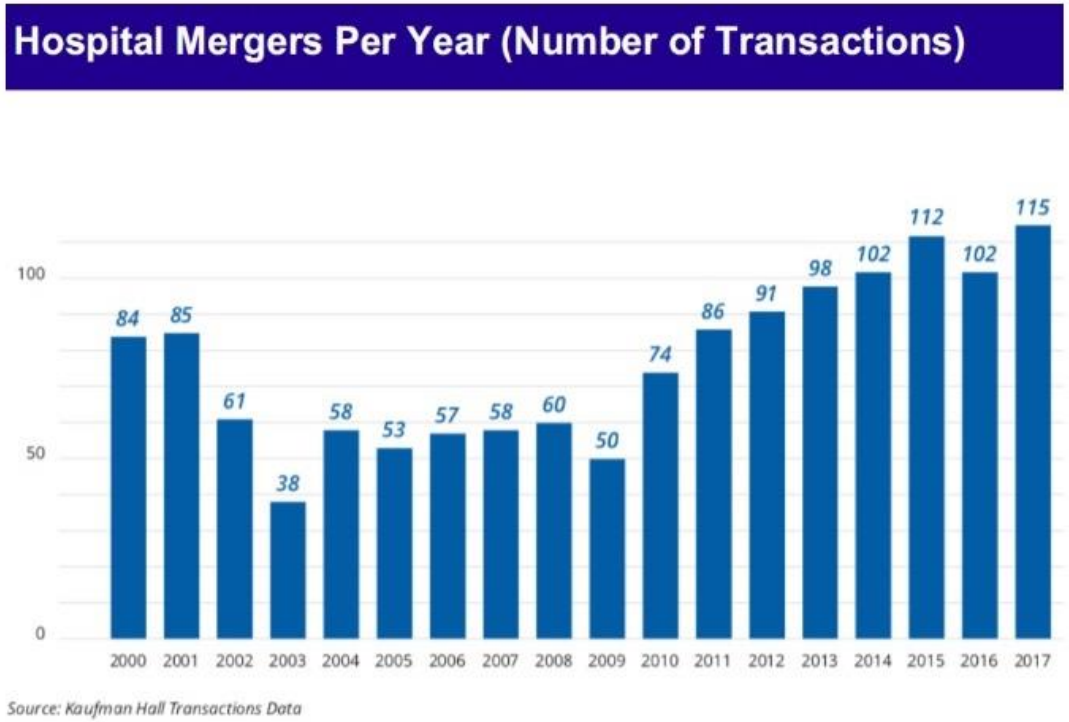
SOURCES Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group; US Department of Commerce, Bureau of Economic Analysis; and National Bureau of Economic Research Inc.

2018

- $3.65 trillion US spending on healthcare
- 17.9% share of GDP
- 59% of spending going to hospitals, doctors, and clinical services.
- US healthcare is larger than national GDPs of Mexico, Spain, Canada and the U.K.

Hospital mergers and concentrated markets

- 2017 “transformative year in medicine”
- 10 transactions involve sellers with net revenues of $1 billion or greater, representing the largest number of mega-deals ever recorded.
- 75% of US hospital markets are now designated as “highly concentrated.”



Largest for-profit HCO

67

HCA Healthcare℠

ConocoPhillips

BEST BUY

AMERICAN EXPRESS

DELTA

ORACLE

AA

Allstate

MERCK

Largest non-profit HCO # 38

KAISER PERMANENTE®

IBM®

LOWE'S®

Revealed: The largest employers in every state

HEALTHCARE IS BIG BUSINE$$

Top 10 Healthcare Systems by Bed Size

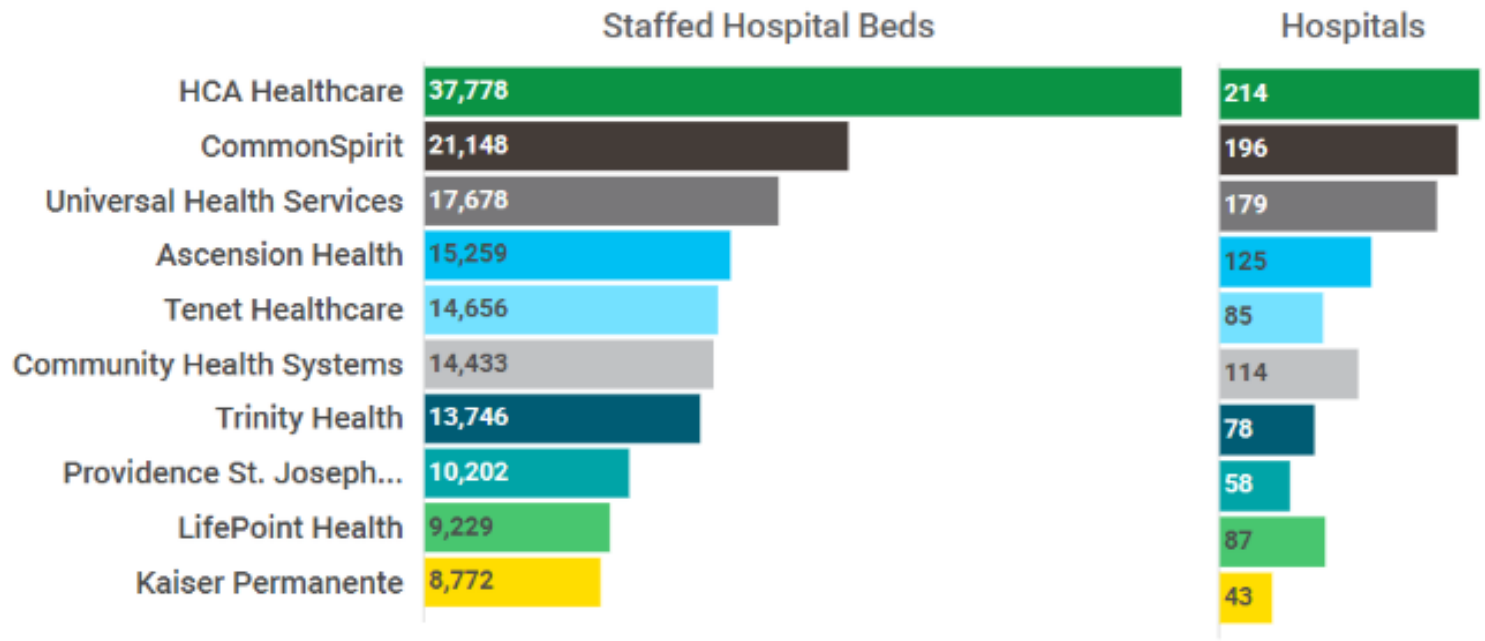
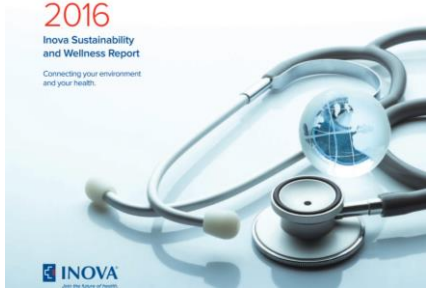


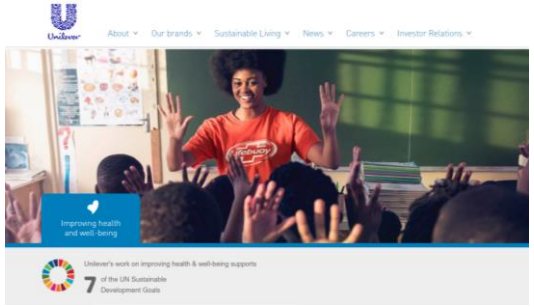
Fig 1 Data from Definitive Healthcare's hospitals and IDNs platform. Number of staffed beds is from hospital self-reporting to CMS. Graphic is from the Definitive Healthcare Expert platform.

Mainstream Business Practice:
PEOPLE PLANET PROFITS

- PLANET (ENVIRONMENTAL)
  - waste, water, GHG emissions, pollution
- PEOPLE (SOCIAL)
  - worker health & safety, diversity and equality, human rights, labor relations, local communities in supply chains

Sustainability or Corporate Social Responsibility Reports





Corporate Social Responsibility

- Voluntary in U.S.
- NON-financial reporting.
- Distinct from regulatory reporting or required US SEC corporate financial filings.
- REQUIRED IN THE EUROPEAN UNION.

A Global Perspective on Climate Change

Climate change is already having an impact on our business at multiple points in our value chain, from our ingredient supply to product distribution, as well as creating water stress in some regions. The most recent Intergovernmental Panel on Climate Change report emphasizes the scale and urgency of this challenge,[1] and the recommendations provide specific guidance for businesses to assess the risks and opportunities of climate change.

With this perspective in mind, we are reviewing our relevant goals and impacts across our operations and our wider value chain. We will continue to evaluate and make changes in our operations and throughout the Coca-Cola system to reduce our carbon footprint, and work with partners and suppliers to help slow the warming trend and to increase our resilience as a business.

YEAR-OVER-YEAR GREENHOUSE GAS EMISSIONS VS. VOLUME GROWTH

As our product sales volume has gone up, our Scope 1 and 2 GHG emissions have gone down. We track our emissions per liter of product sold at a system level, expressed as a ratio (grams of CO_2 in relation to liters of product produced). This is an important performance metric as we continue to address our climate impacts.

See additional performance indicators in the Data Appendix.

1 IPCC Special Report October 2015. https://www.ipcc.ch/sr15/
2 The calculation of progress toward our "drink in your hand" goal has been internally vetted using accepted and relevant scientific and technical methodologies, which are aligned with GHG Protocol scopes 1, 2 and 3. Due to the nature of our franchise bottling system, our manufacturing emissions are normally split between Scopes 1 and 2 for company-owned facilities and Scope 3 for bottling partner facilities. However, in our "drink in your hand" calculations, we consider the full Coca-Cola system (including franchise bottling partners) in the calculation of our manufacturing, distribution and refrigeration emissions.
3 2018 data not available as of April 24, 2019

GOAL

Reduce the carbon footprint of the "drink in your hand" by 25% by 2020 against a 2010 baseline.

PROGRESS

In 2018, it is estimated we reduced the CO_2 embedded in the Coca-Cola "drink in your hand" by 21% below 2010 levels.[2]

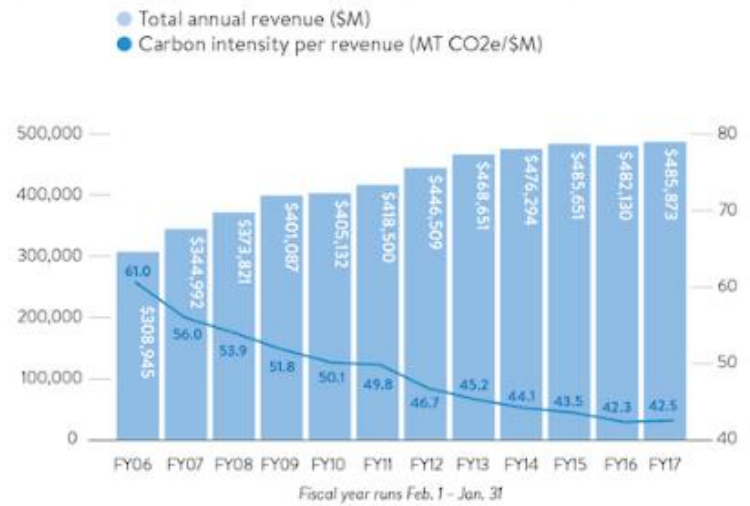
Walmart

Reducing emissions in our own operations

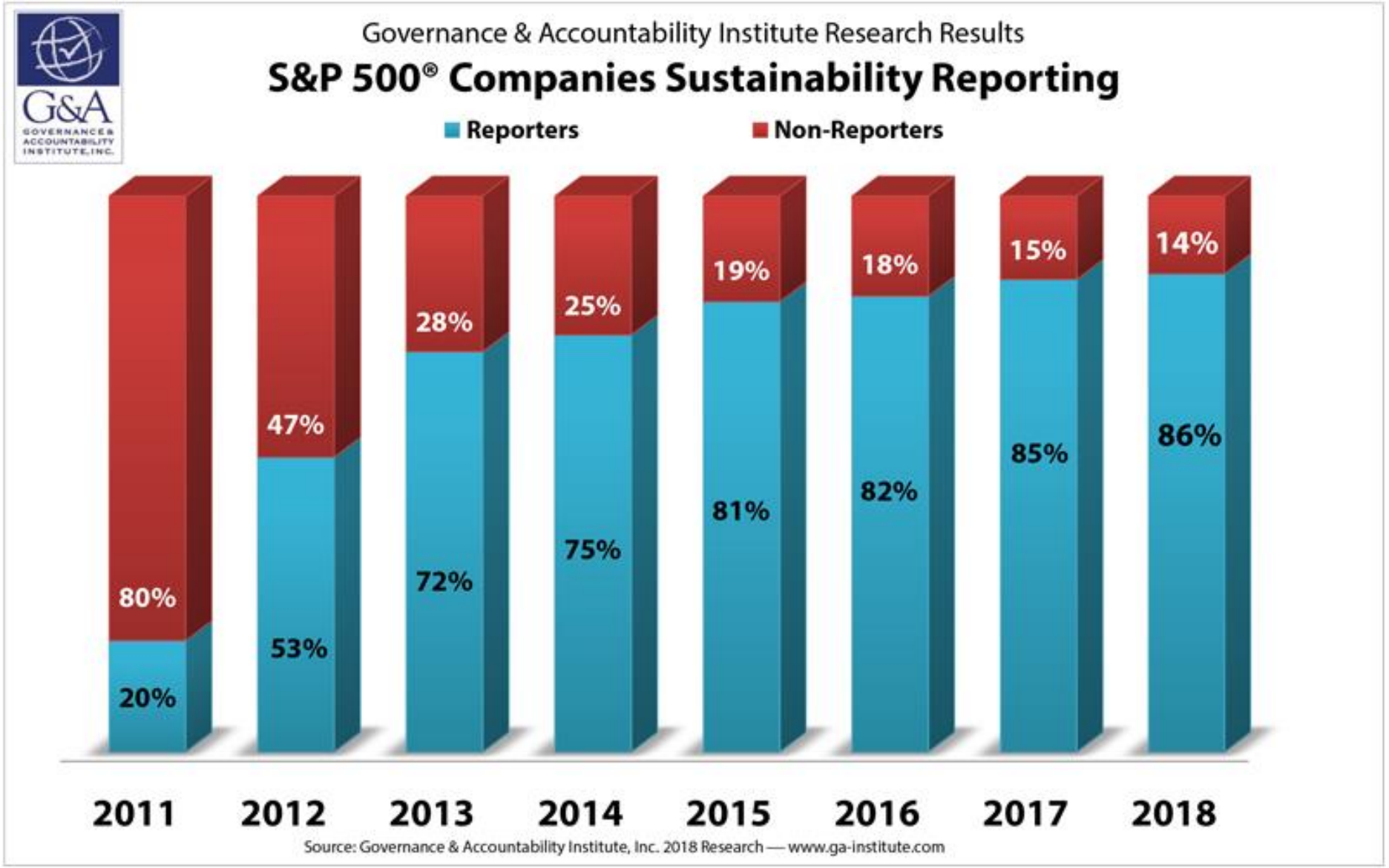
Despite steady growth in our business over the years, our own emissions (Scope 1 and 2) have been held relatively constant. In fact, our global carbon intensity per total revenue (CO2e/$) has reduced 30 percent since 2005. That means we continue do more with less. However, science-based targets are about reducing absolute emissions. That is why we set an even more ambitious path for ourselves for the decade ahead.

- Purchased Electricity—**73%**
- Refrigerants—**13%**
- Onsite Fuels—**7%**
- Transport Fuels—**7%**

Carbon intensity (Scope 1 and 2) vs. revenue



Fiscal year runs Feb. 1 – Jan. 31


Governance & Accountability Institute Research Results
S&P 500® Companies Sustainability Reporting
Reporters
Non-Reporters
80%
20%
47%
53%
28%
72%
25%
75%
19%
81%
18%
82%
15%
85%
14%
86%
2011
2012
2013
2014
2015
2016
2017
2018
Source: Governance & Accountability Institute, Inc. 2018 Research — www.ga-institute.com

But also NGOs and governments

Forbes America's Largest Private Companies

The List

Spreadsheet Reprints Logo Licensing

Filter list by: Rank Company

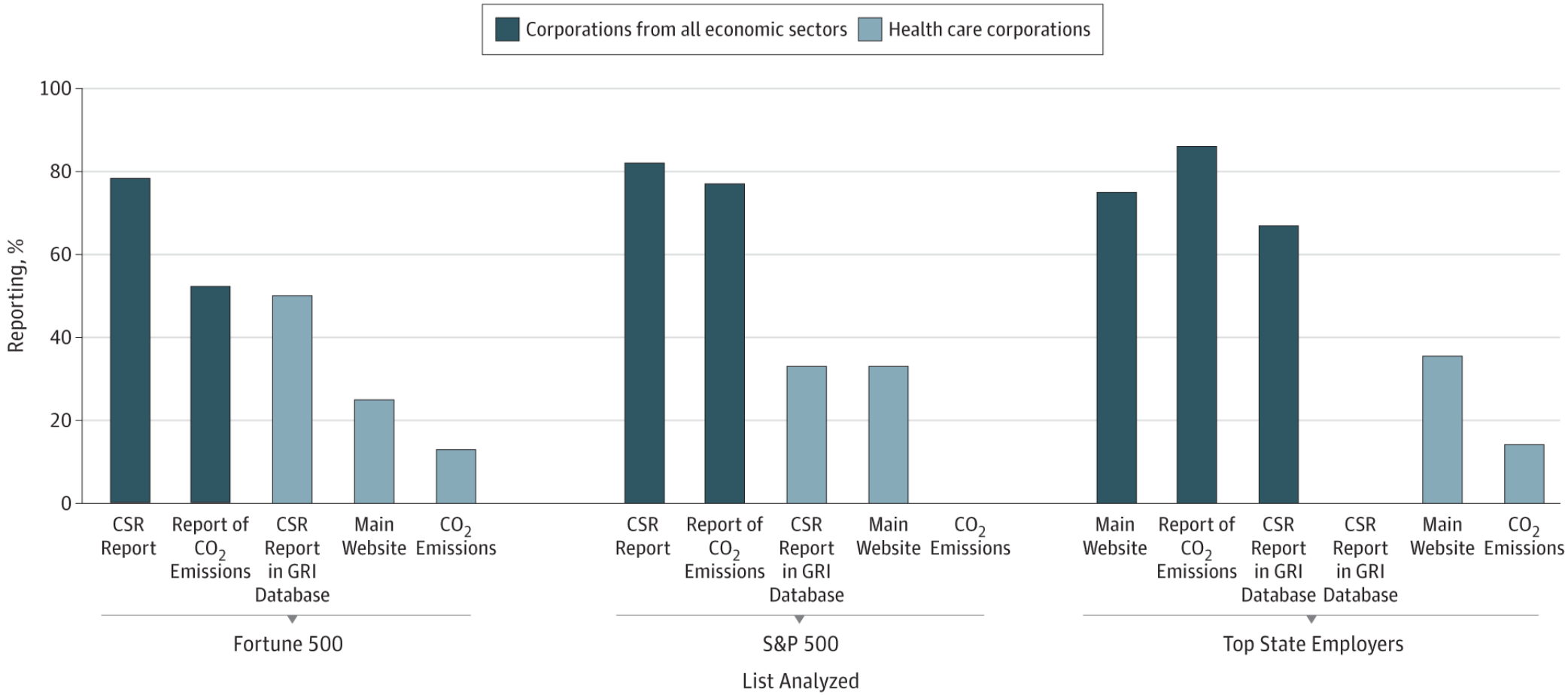
Search by company name

	Rank	Company	State	Industry	Revenue	Employees
Cargill	#1	Cargill	Minnesota	Food, Drink & Tobacco	$114.7 B	155,000
KOCH INDUSTRIES INC.	#2	Koch Industries	Kansas	Multicompany	$110 B e	120,000
Albertsons	#3	Albertsons	Idaho	Food Markets	$59.9 B	275,000
Deloitte.	#4	Deloitte	-	Business Services & Supplies	$43.2 B	263,900
pwc	#5	PricewaterhouseCoopers	-	Business Services & Supplies	$41.3 B	236,000
MARS	#6	Mars	Virginia	Food, Drink & Tobacco	$35 B	100,000

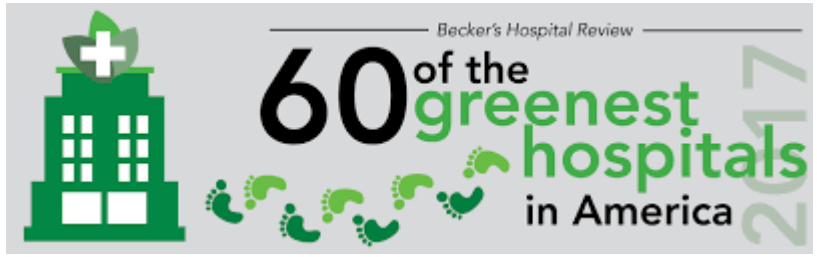
JAMA Network™

From: **Assessment of Environmental Sustainability and Corporate Social Responsibility Reporting by Large Health Care Organizations**

JAMA Netw Open. 2018;1(4):e180975. doi:10.1001/jamanetworkopen.2018.0975



“Green” Awards



Green Hospital

THE GLOBAL COMPACT
UNITED NATIONS GLOBAL COMPACT

Human Rights		Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights; and Principle 2: make sure that they are not complicit in human rights abuses
Labour		Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining; Principle 4: the elimination of all forms of forced and compulsory labour; Principle 5: the effective abolition of child labour; and Principle 6: the elimination of discrimination in respect of employment and occupation
Environment		Principle 7: Businesses are asked to support a precautionary approach to environmental challenges; Principle 8: undertake initiatives to promote greater environmental responsibility; and Principle 9: encourage the development and diffusion of environmentally friendly technologies
Anti-Corruption		Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery

Coca-Cola Enterprises | SUSTAINABLE DEVELOPMENT GOALS

Sustainable Development Goals and our Sustainability Commitments

Coca-Cola Enterprises is committed to supporting the Sustainable Development Goals. We believe in the power of partnership between business, government and civil society to create a more sustainable world. Through our sustainability commitments and targets we are playing our part in helping to support the Global Goals.

1 NO POVERTY

We are committed to **supporting the communities** in which we operate. We aim to invest 1% of our annual pre-tax profit to support charitable and community partners.

2 ZERO HUNGER

In Great Britain, we established a partnership with **the charity FareShare** to ensure that any surplus stock is donated to local projects and charities. Drinks worth an equivalent value of £100k were donated in 2014.

3 GOOD HEALTH AND WELL-BEING

Obesity is a complex challenge, influenced by many factors. We understand that diet and calorie intake, including calories in our products can have an impact on health and wellbeing. **We will play our part** by reducing calories across our portfolio by 10% and enabling three million people to be physically active by 2020.

4 QUALITY EDUCATION

We want to help young people gain the skills they need for the workplace. Through our education centers and partnerships (including Passport to Employment in France, The Real Business Challenge in Great Britain and JINC in the Netherlands) we will **support the skills development and learning needs of 250,000 young people** each year by 2020.

5 GENDER EQUALITY

We seek to attract, develop and motivate **a workforce that reflects the diversity** of the communities in which we operate. We aspire to have a minimum of 40% of women in both management and leadership grades by 2025.

6 CLEAN WATER AND SANITATION

We protect the future sustainability of our **local water sources** and undertake source vulnerability assessments to assess water quality and water scarcity risks. We use as little water as possible and aim to use 1.2 liters of water for each liter of product we make. We safely return to nature 100% of the wastewater from our manufacturing operations.

7 AFFORDABLE AND CLEAN ENERGY

We are part of the RE100 initiative and have committed to **source 100% of our electricity from renewable sources** by 2020. This will help us to reduce the carbon footprint of our products by a third by 2020.

8 DECENT WORK AND ECONOMIC GROWTH

We aim to achieve world-class safety standards and a zero-accident workplace. We have also developed our **Sustainable Agriculture Guiding Principles** to ensure that our suppliers respect human and workplace rights across our value chain.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Our local economic contribution includes the jobs we provide and the investments we make. Across our territories, each Coca-Cola job supports on average a further nine jobs in the wider economy – from suppliers and transport to hospitality and retail workers.

10 REDUCED INEQUALITIES

We aim to **support the skills development and learning needs of 250,000 young people** each year by 2020 with our eight education centers and several education partnership programs.

11 SUSTAINABLE CITIES AND COMMUNITIES

We are committed to **supporting the communities** in which we operate. We aim to invest 1% of our annual pre-tax profit to support charitable and community partners.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

We support the circular economy and aim to use as little **packaging material** as possible and use both recycled and renewable materials. All our cans and bottles are fully recyclable, our manufacturing sites send zero waste to landfill.

13 CLIMATE ACTION

We will substantially **reduce the carbon footprint** of our manufacturing operations, transportation and refrigeration equipment – enabling us to reduce the carbon footprint of our core business operations by 50% by 2020. We'll also deliver carbon reductions across our wider value chain, including our packaging and ingredients.

14 LIFE BELOW WATER

We **protect the future sustainability of the water sources** we use and aim to replenish the water we use in areas of water stress. We are investing in community based water partnerships with WWF in France and Great Britain, Clean the Beaches in Sweden and Natuurpunt in Belgium.

15 LIFE ON LAND

The long-term availability of our key agricultural ingredients is crucial to our business - every bottle of Coca-Cola contains agricultural ingredients that start on a farm. We will **source 100% of our key agricultural ingredients sustainably** by 2020.

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

We **operate responsibly and sustainability** and we are on a journey to create a sustainable business for the future. Corporate responsibility and sustainability is at the heart of everything that we do.

17 PARTNERSHIPS FOR THE GOALS

We collaborate with customers, suppliers, thought leaders, NGOs and members of our local communities to grow a low-carbon, zero-waste business and lead change for a more sustainable tomorrow.

Cleveland Clinic

Sustainability & Global Citizenship Report

Serving Our Present, Caring for Our Future

Call 216.448.8729

CONTACT US

About the 2018 Report

As a leader in the healthcare industry, we are accountable for our social, environmental and economic impacts. We develop this report annually for our patients, caregivers, communities and global stakeholders to share our sustainability performance metrics and stories. We are the only top-ranked US News & World Report healthcare system that measures our progress with the UN Global Compact's Ten Principles and the Global Reporting Initiative's standards. We are proud to share this information and appreciate your interest.

LEARN MORE

View Our Sustainability & Global Citizenship Report for 2018

Patients

"Patients First" is our guiding principle. We believe our patient-centered culture focused on compassion ensures our sustainable, long-term and viable future.

Caregivers

Our caregivers are our most important resource, and they work hard to put patients first every day. Cleveland Clinic works equally as hard to care for our caregivers.

Community

Cleveland Clinic is committed to serving our communities by providing high-quality healthcare and wellness services, medical research and education.

Environment

Cleveland Clinic supports healthy environments for healthy communities and understands that human health and environmental health are inherently linked.

Practice Greenhealth is the nation's leading membership and networking organization for organizations in the healthcare community that have made a commitment to sustainable, environmentally preferable practices.

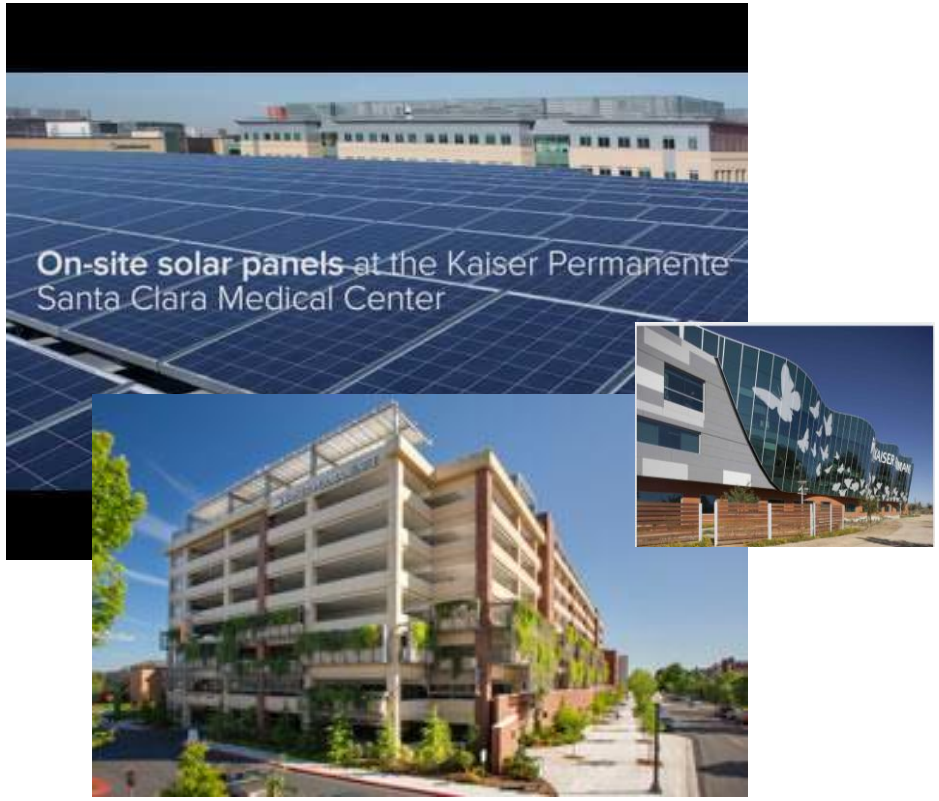
More than 1,300 leading health care organizations and suppliers to the sector who act as change agents and healing forces in their communities on behalf of patients, staff, and the environment at large.

CleanMed2017
Anchoring Healthy Communities

Gundersen Health System

GUNDERSEN
HEALTH SYSTEM®

Kaiser Permanente 2025 Goals



- Be “carbon net positive”
- Buy all food locally or from sustainable producers
- Recycle, reuse or compost 100 percent of non-hazardous waste
- Reduce the amount of water we use by 25%
- Increase purchases of environmentally friendly products
- Meet international standards for environmental management
- Help reduce risks to foodsheds, watersheds and air basins

Boston Medical Center

Health care institutions making environmental commitments

100% renewable electricity by 2050

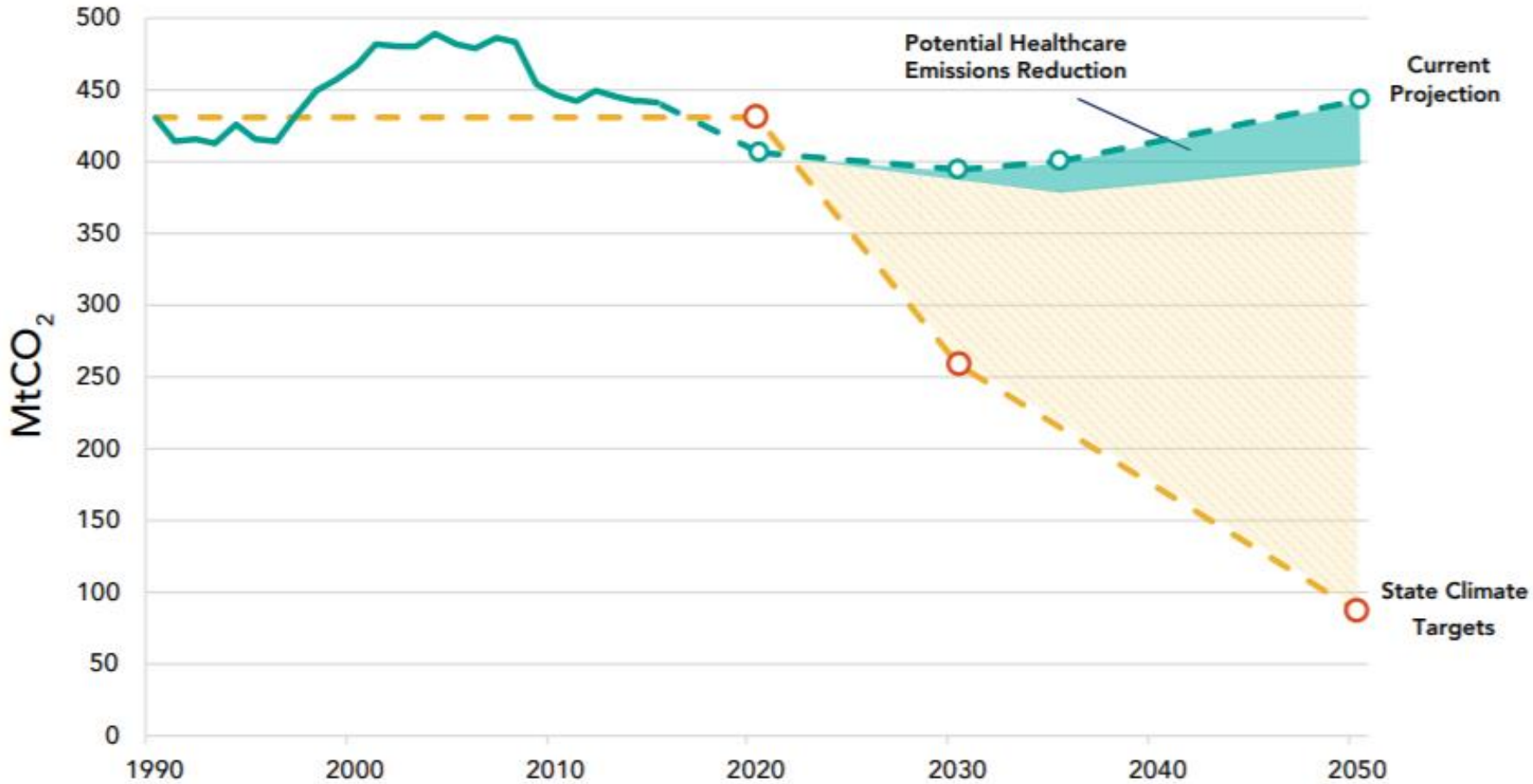
- Advocate Aurora Boston Medical Center
- Gundersen Health System
- Kaiser
- Rochester Regional Health System
- Partners HealthCare
- University of California Health
- University of Vermont Medical center

decarbonizing healthcare pledge

- Beth Israel Deaconess Medical Center
- Partners Healthcare
- Boston Children's Hospital
- Cambridge Health Alliance
- Dana-Farber Cancer Institute
- Joslin Diabetes Center
- Harvard Medical School

HARVARD MEDICAL SCHOOL

Healthcare Can Halt Growth in California Emissions and Contribute to Meeting Ambitious Climate Goals



Note: Healthcare has the potential to reduce CA emissions by almost 10 percent, but all sectors must act to meet ambitious 2030 and 2050 targets.
Source: California Air Resources Board; Environmental Impacts of the U.S. Healthcare System and Effects on Public Health. PLoS ONE
Analysis: Bay Area Council Economic Institute

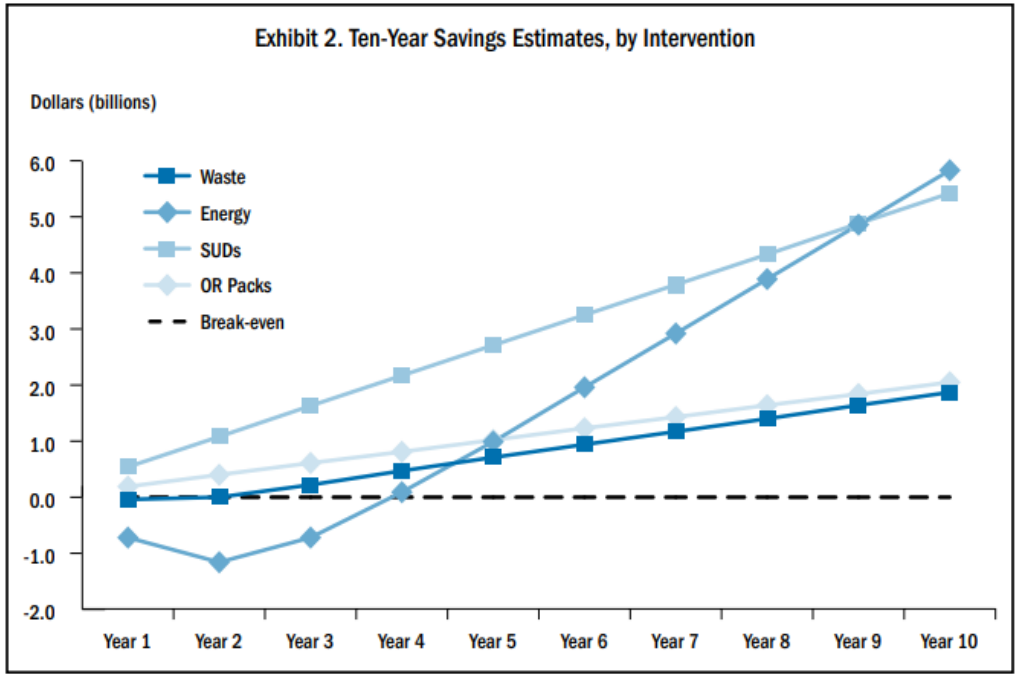
Environmental and sustainability initiatives

- LEED Certification new builds
- LED lighting retrofit
- Combined heat and power (co-gen)
- Sustainable food purchases/reducing meat
- Composting
- Recycling programs
- Sustainable grounds keeping
- Healing green spaces
- Reuse programs (lab chemicals)
- EPP options
- Active transportation (bike racks)
- Installing energy efficient equipment
- HVAC controls
- Shut the sash programs (fume hoods)
- Operating room sustainability practices

Can sustainable hospitals bend the cost curve?

Commonwealth Fund Study

- If all US hospitals managed energy, waste, OR supplies through reprocessing and efficient purchasing as exemplars would provide a ROI of $15 billion over a decade.



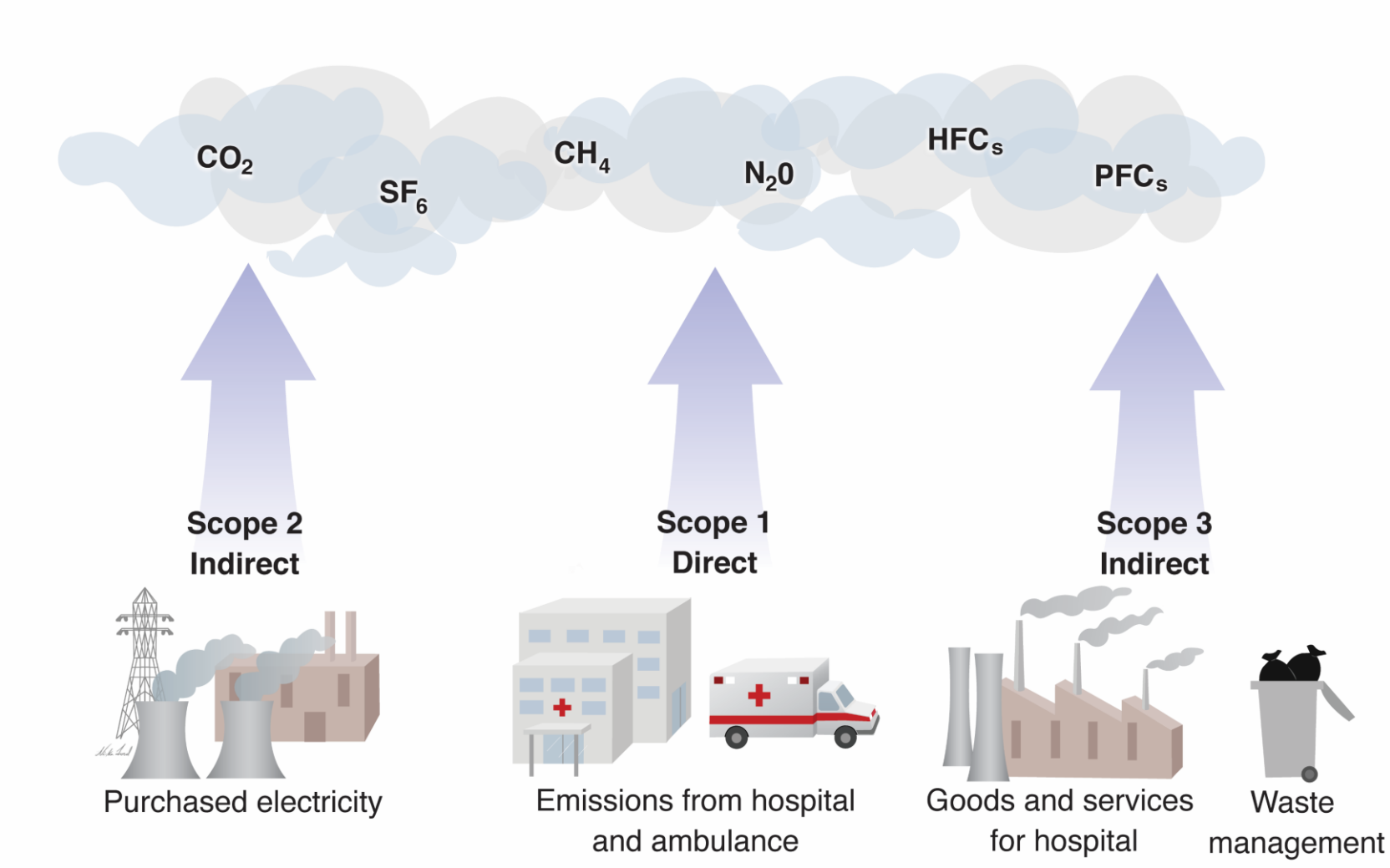
The way forward…

…all others bring data.

“You can’t manage what you don’t measure.”

- Measure: The verb means "to ascertain the measurements of"
- Measurement: The figure, extent, or amount obtained by measuring"
- Metric: "A standard of measurement."
- Benchmark: "A standard by which others may be measured."

Vital Signs: Scope 1,2 and 3 emissions



CSR Metric Driven:
Investors want to compare.

Frameworks for CSR Action

Largely speaking, CSR is increasingly streamlined, comprehensive, and metric-driven. Some popular frameworks driving action include:

- Global Reporting Initiative
- ISO 26000
- UN Global Compact (largest international CSR agreement)

DRIVING SUSTAINABLE ECONOMIES

UCSF Office of Sustainability

search

About Us / Contact Us | **Review Metrics & Annual Reports** | Greening the Health System | Get Involved | Stay Informed | Recycling & Waste Reduction

- Review Metrics
- Annual Report FY 17-18
- Annual Report FY 16-17
- Annual Report FY 15-16
- Annual Report FY14-15
- Action Plan 2.0 FY 13-14
- Annual Report FY12-13
- Annual Report FY11-12
- Annual Report FY10-11
- Annual Report FY09-10
- Climate Action Plans
- Med Center 2015 Sustainability Report
- Med Center 2014 Sustainability Report
- Med Center 2013 Sustainability Report

Review Metrics & Annual Reports

Sustainability Dashboard

Click an icon to explore

Carbon Emissions | Employee Commute | Culture Shift | Sustainable Food | Green Building

Hazardous Waste | Medical Waste | Solid Waste | Paper | Water Usage

Carbon Emissions

Carbon Emissions UC San Francisco's goals are to reduce current emission levels to our 1990 levels by 2020 and meet the UC system-wide goal, presented by the Sustainable Practices Policy, to be Carbon Neutral by 2025. UCSF emissions are based upon five major sources: electricity, natural gas, fleet vehicles, commute and air travel. Commute and air travel are two areas where we can engage the campus community to reduce emissions through the increased use of teleconferencing, teleworking and public transit. Department and individual actions such as purchasing energy efficient equipment and turning off lights, appliances, and computer monitors will also play a major role in reaching our emission reduction goals.

Emissions are tracked and reported at three levels of scope. Scope 1 refers to direct emissions from our owned or controlled sources. Scope 2 emissions are indirect and created from the generation of purchased energy. Scope 3 is employee commute and business travel.

Deep energy efficiency projects such as heating/cooling mechanical retrofits and lighting retrofits is

Get Inspired! »

2018-2019 Sustainability Videos

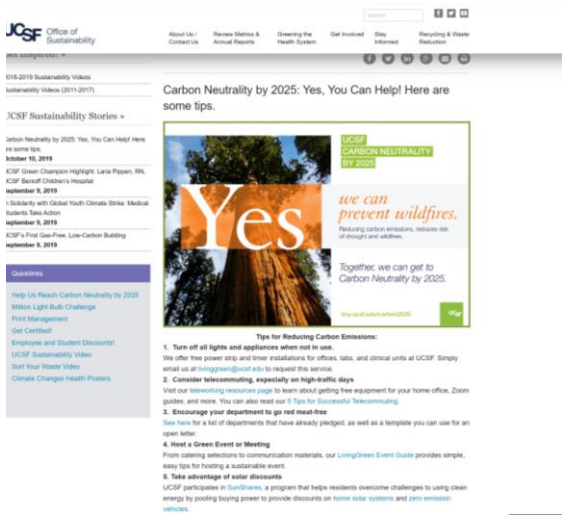
Sustainability Videos (2011-2017)

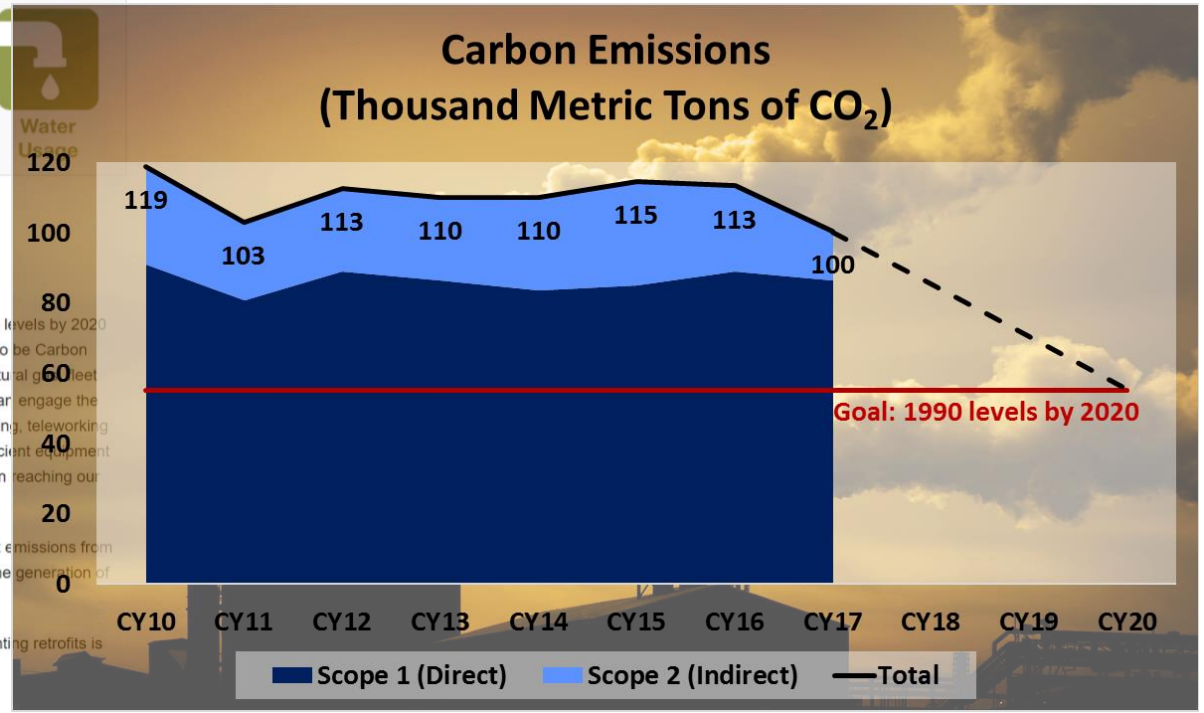
UCSF Sustainability Stories »

Carbon Neutrality by 2025: Yes, You Can Help! Here are some tips.
October 10, 2019

UCSF Green Champion Highlight: Laria Pippen, RN, UCSF Benioff Children's Hospital
September 9, 2019

In Solidarity with Global Youth Climate Strike: Medical Students Take Action
September 9, 2019





Cleveland Clinic

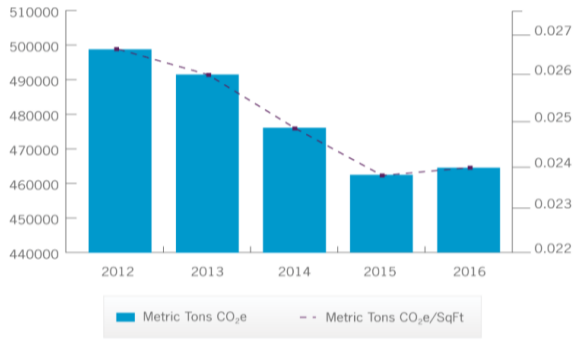
Climate Resilience

Cleveland Clinic recognizes that the healthcare sector will be directly and indirectly affected by the impacts of climate change. Children, the elderly and the disadvantaged will be most at risk, and we are likely to see increases in heat-related disorders, respiratory disorders, infectious diseases, food insecurity, and mental health issues.

As a leader in healthcare, we understand we have an important role to play, and our response to these challenges will guide the evolution of our organization in the coming decades. We will continue to lead our sector and explore creative solutions to environmental challenges that benefit our community and support economic health. Our efforts are strategically aligned with those of our community, providing opportunities to collaborate, innovate and form meaningful shared goals.

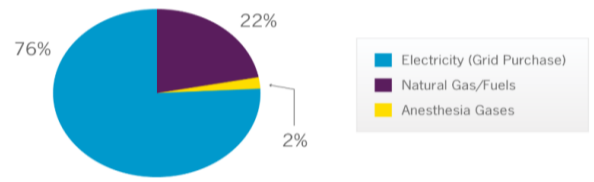
Carbon Mitigation

Cleveland Clinic Scope 1& 2 Carbon Footprint
Improvement from 2012 Baseline



Cleveland Clinic's 2016 scope 1 & 2 carbon footprint totaled 464,556 metric tons of CO2e. This is a 0.5% increase from 2015 and a 7% reduction from 2012. 76% of our footprint is from purchased electricity, 22% is from direct usage of fuels in assets owned by Cleveland Clinic and 2% is from anesthesia gases. More than 96% of our carbon footprint is located in Northeast Ohio in our Hospitals, Family Health Centers, Medical Office Buildings and Administrative Facilities.

Cleveland Clinic Carbon Footprint



Cleveland Clinic calculated its scope 1 & 2 carbon footprint using the GHG protocol for electricity, natural gas, fuels used by generators and vehicles and anesthesia gases. ENERGY STAR's Portfolio Manager was used to calculate the electricity carbon footprint since it utilizes site specific eGRID factors for each location. For locations not tracked in portfolio manager a system average factor was applied to the electricity

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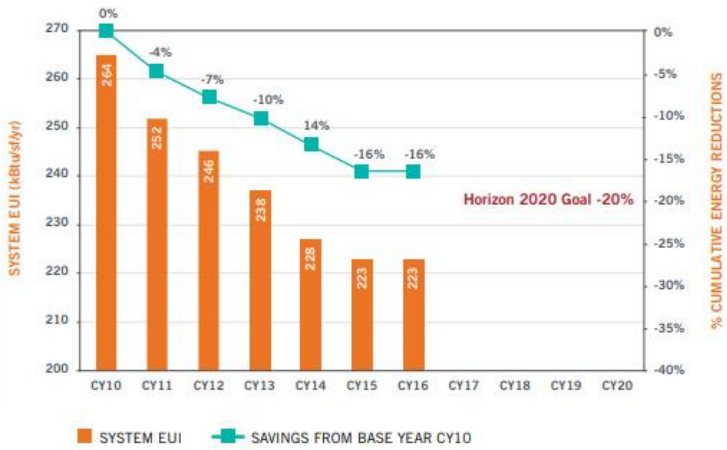
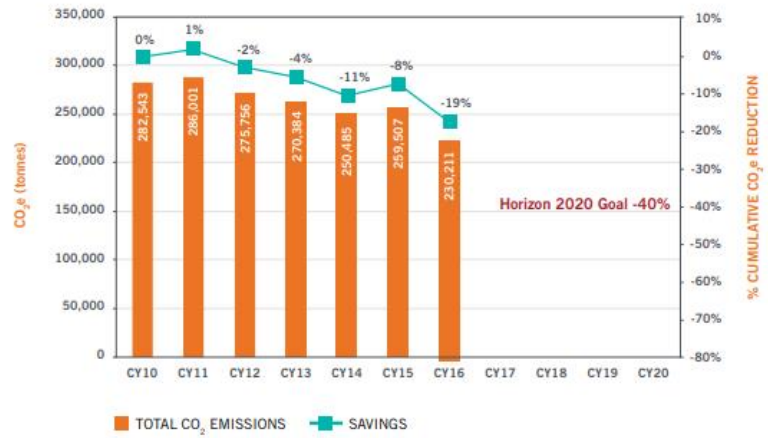
Climate Resilience
- Energy
- Water

Materials Stewardship
G4 Content Index

System Energy Use Intensity and % Cumulative Reductions



Total CO_2 Emissions and % Cumulative Reductions



Since square footage has increased by 22% since CY 10, it is estimated conservatively that total emissions have actually dropped by 30% from the original square footage of base year CY 10.

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Reporting and Materiality

Dignity Health has been reporting on its environmental, social, and economic/governance (ESG) performance for two decades, using the format developed by the Global Reporting Initiative (GRI). We have prepared this report in accordance with the core GRI Sustainability Reporting Standards. At Dignity Health sustainability encompasses all elements of our operations. This report highlights the sustainability initiatives of our 39 acute care facilities serving communities in California, Arizona, and Nevada for the period of July 1, 2016 to June 30, 2017. With the exception of the audited financial statements, we have not submitted the report for external assurance.

We regularly review the universe of issues we could report on in order to focus on those most important to our organization, our stakeholders, and society at large. We strive to report on those issues that are material from a sustainability perspective and over which we have a reasonable level of influence or control. In our sustainability reporting, we define materiality by the degree to which an issue is significant to our organization, our industry, society, and our interested stakeholders, and the degree to which it is relevant to our scope of operations and ethical commitments. The topics covered in this report represent our ESG priorities identified through our most recent ESG assessment.

For questions and/or comments about this report contact Mary Ellen Leciejewski, OP, VP Corporate Responsibility at **MaryEllen.Leciejewski@DignityHealth.org**

(102-45, 102-47, 102-50, 102-51, 102-52, 102-53, 102-54, 102-56)

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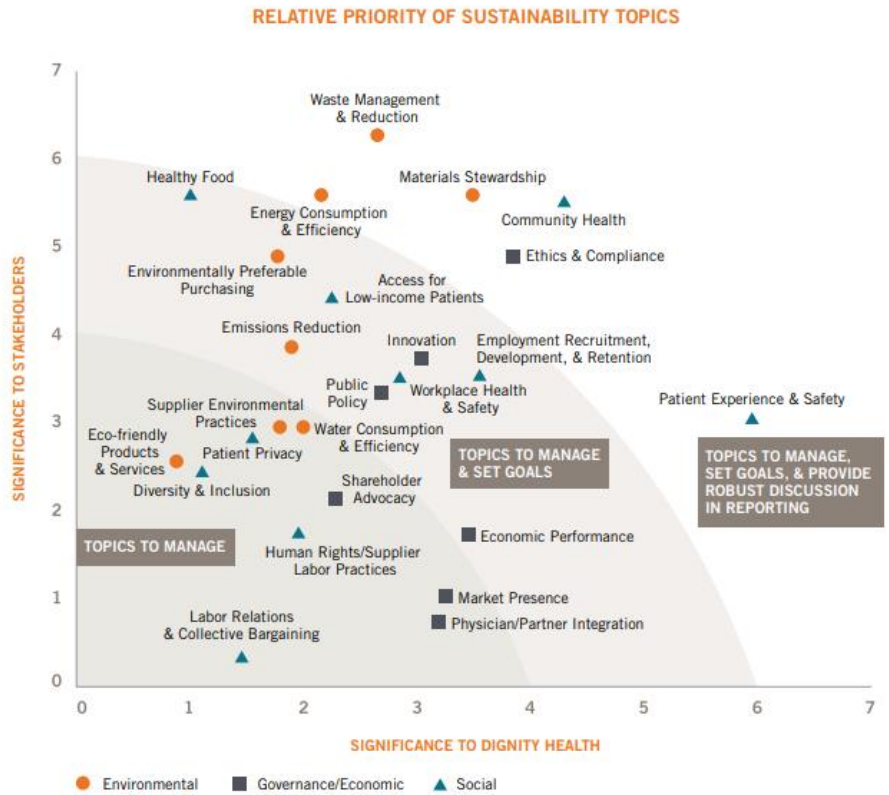
Climate Resilience

Materials Stewardship

GRI Content Index

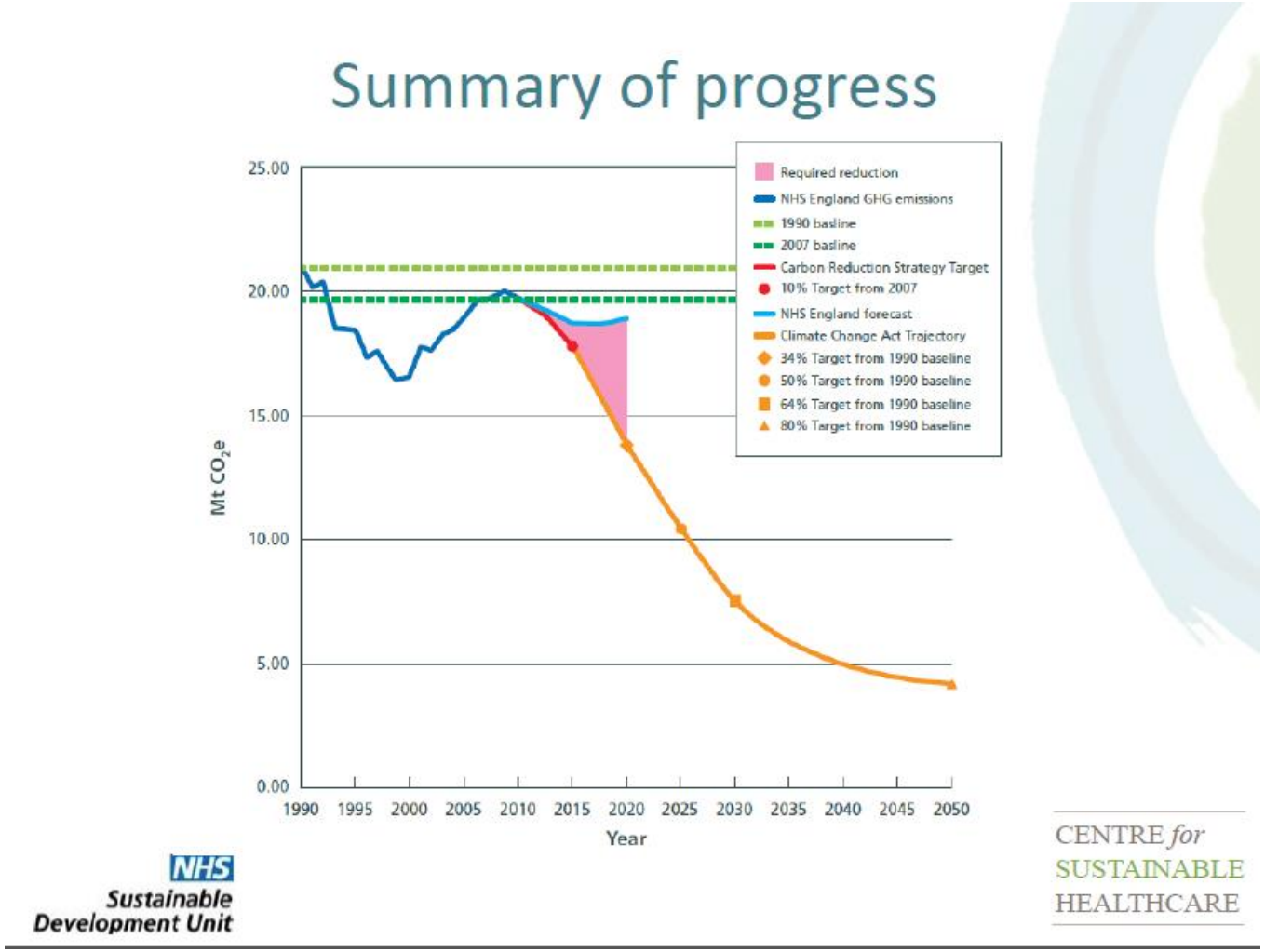
ESG Materiality Matrix

This matrix plots the relative priority of the issues identified from the perspective of both internal and external stakeholders.



(103-2)

England is one of only 4 nations to track healthcare GHG emissions



NHS Top 20 countdown

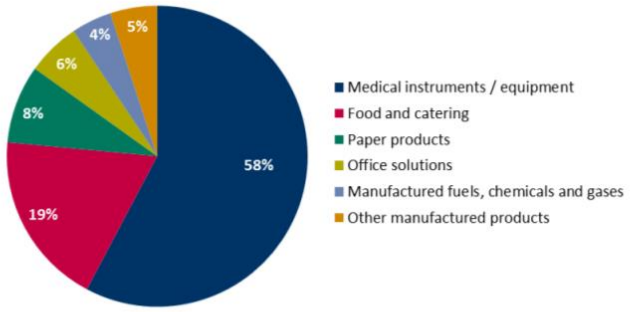


Table 3.1 ***Suppliers Expenditures, Weight and Carbon Footprint by Category of Purchased Good***

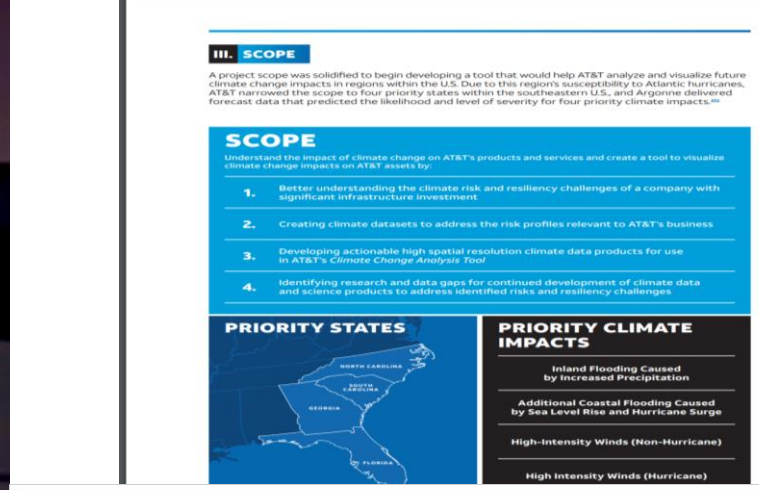
Category	Total expenditure (Million £)	Percentage of exp.	Total weight (tonnes)	Weight percentage	Total GHG estimate (tonnes CO_2e)	GHG percentage
Medical instruments / equipment	1,288	85%	110,290	54%	300,512	**58%**
Food and catering	48	3%	26,332	13%	97,492	**19%**
Paper products	48	3%	39,748	19%	43,723	**8%**
Office products	36	2%	6,324	3%	29,854	**6%**
Manufactured fuels, chemicals and gases (2)	57	4%	9,508	5%	22,538	**4%**
Other manufactured products	45	3%	11,673	6%	26,289	**5%**

Medical devices are by far the most significant items associated with the suppliers procurement in terms of cost, volume and GHG impact. This

Table 3.2 ***Top 20 Contributors - Medical Instruments and Equipment (In Alphabetical Order)***

Item groups	
Blood sample tubes	
Catheters, tubing and drains	
Clinical waste containers	
Clothes, caps, masks & overshoes	
Disposable incontinence	
Disposable medical holloware	
Bandages, dressings & gauzes	
Drapes	Single-use devices
Electrode gel	
Examination gloves	
Medical packs	
Medical pulp products	
Needle free connection systems	
Polythene aprons	
Single use surgical instruments	
Syringes & needles	
CO monitors and spirometers	
Crutches, walking sticks and frames	Products made of carbon intensive material
Hearing aids	
Patient assessment electronic devices	

Climate ready means better information



III. SCOPE

A project scope was solidified to begin developing a tool that would help AT&T analyze and visualize future climate change impacts in regions within the U.S. Due to this region's susceptibility to Atlantic hurricanes, AT&T narrowed the scope to four priority states within the southeastern U.S., and Argonne delivered forecast data that predicted the likelihood and level of severity for four priority climate impacts.[xiii]

SCOPE

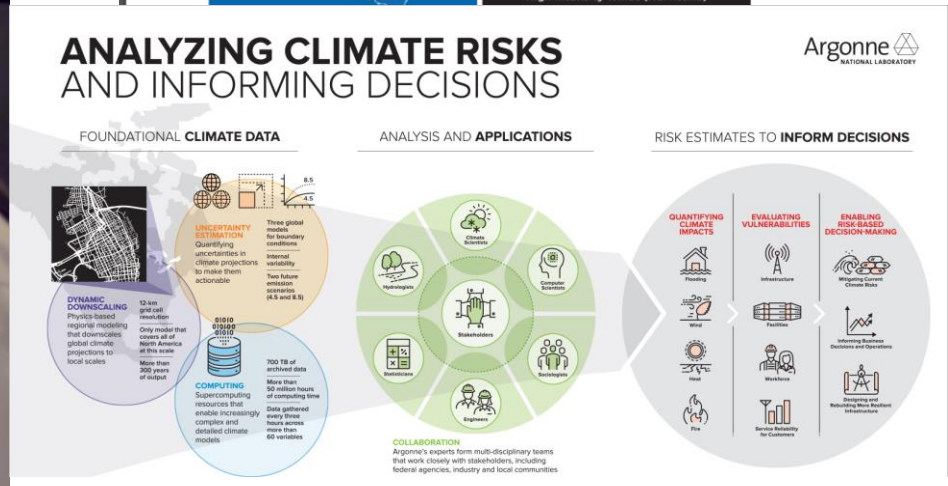
Understand the impact of climate change on AT&T's products and services and create a tool to visualize climate change impacts on AT&T assets by:

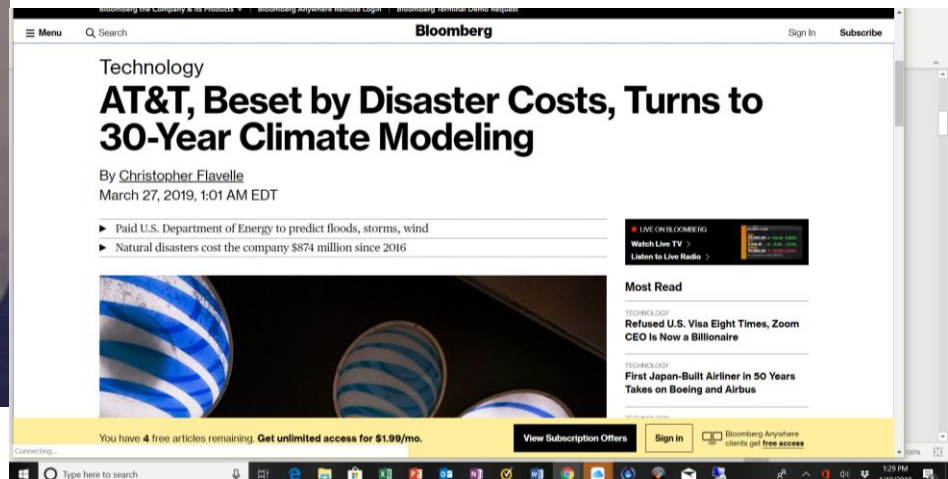
1. Better understanding the climate risk and resiliency challenges of a company with significant infrastructure investment
2. Creating climate datasets to address the risk profiles relevant to AT&T's business
3. Developing actionable high spatial resolution climate data products for use in AT&T's *Climate Change Analysis Tool*
4. Identifying research and data gaps for continued development of climate data and science products to address identified risks and resiliency challenges

PRIORITY STATES

PRIORITY CLIMATE IMPACTS

- Inland Flooding Caused by Increased Precipitation
- Additional Coastal Flooding Caused by Sea Level Rise and Hurricane Surge
- High-Intensity Winds (Non-Hurricane)
- High Intensity Winds (Hurricane)

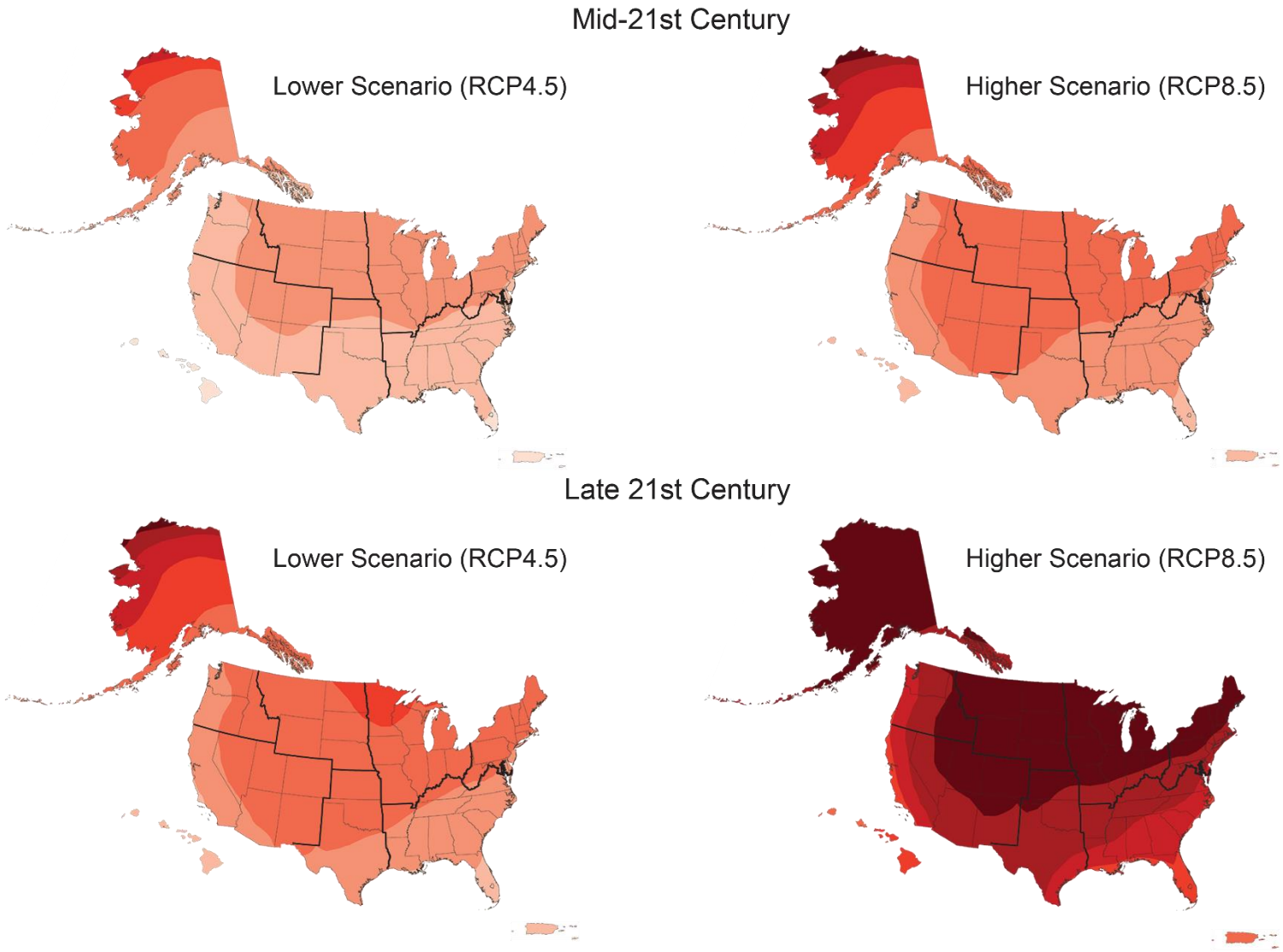




NIH BUDGET FOR CLIMATE: 0.05%

Bigger boat

Bigger budget


Mid-21st Century
Lower Scenario (RCP4.5)
Higher Scenario (RCP8.5)
Late 21st Century
Lower Scenario (RCP4.5)
Higher Scenario (RCP8.5)
Change in Temperature (°F)
−1
0
1
2
3
4
5
6
7
8

Are we underestimating risks?

- Climate risks may be non-linear, abrupt and difficult to predict.
- Climate is a risk multiplier.
- Economic and social costs may therefore be much higher.

FORRESTER® RESEARCH

Potential Financial Impacts Of Climate Change On Business

Adapt To Climate Change Or Face Extinction

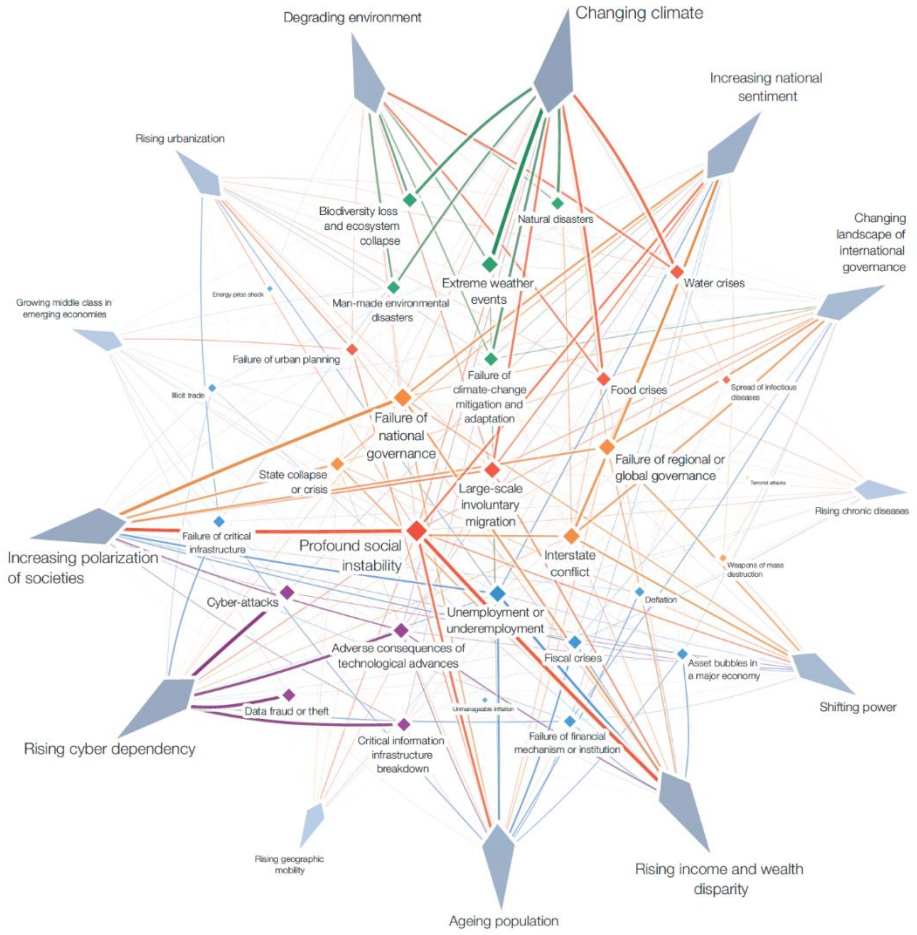
139992

Risks are connected

"Of all risks, it is in relation to the environment that the world is most clearly sleepwalking into catastrophe"

-WEF Global Risk Report 2019

#1 Risk trend—climate change

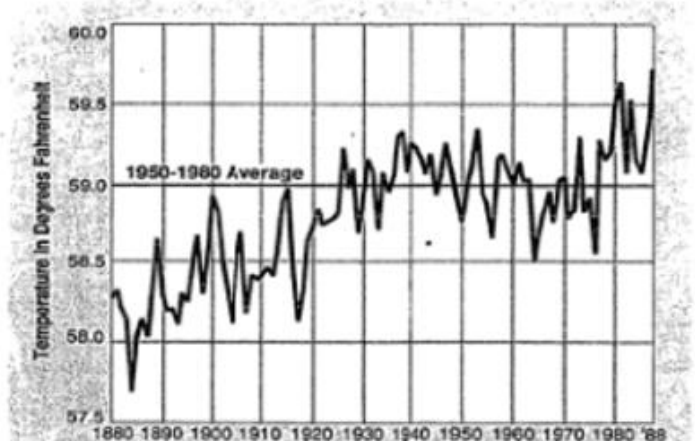


"All the News That's Fit to Print"

The New York Times

VOL.CXXXVII . . . No. 47,546 NEW YORK, FRIDAY, JUNE 24, 1988

Global Warming Has Begun, Expert Tells Senate



Global Warming: Greenhouse Effect?

Average global temperatures through the first five months of 1988. As a baseline, scientists use the global average from 1950 to 1980.

Source: James E. Hansen and Sergej Lebedeff

The New York Times/June 24, 1988

Sharp Cut in Burning of Fossil Fuels Is Urged to Battle Shift in Climate

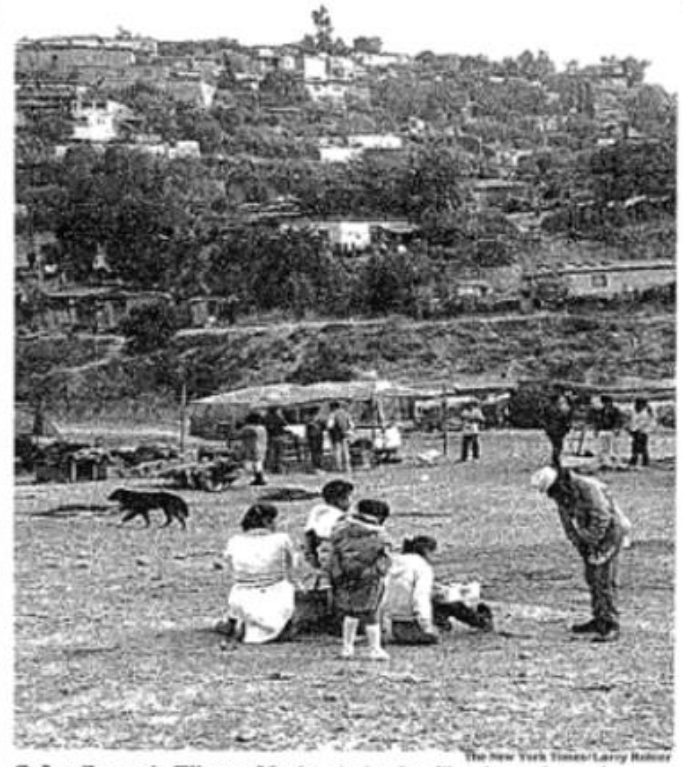
By PHILIP SHABECOFF
Special to The New York Times

WASHINGTON, June 23 — The earth has been warmer in the first five months of this year than in any comparable period since measurements began 130 years ago, and the higher temperatures can now be attributed to a long-expected global warming trend linked to pollution, a space agency scientist reported today.

Until now, scientists have been cautious about attributing rising global temperatures of recent years to the predicted global warming caused by pollutants in the atmosphere, known as the "greenhouse effect." But today Dr. James E. Hansen of the National Aeronautics and Space Administration told a Congressional committee that it was 99 percent certain that the warming trend was not a natural variation but was caused by a buildup of carbon dioxide and other artificial gases in the atmosphere.

An Impact Lasting Centuries

Dr. Hansen, a leading expert on climate change, said in an interview that there was no "magic number" that showed when the greenhouse effect was actually starting to cause changes in climate and weather. But he added, "It is time to stop waffling so much and say that the evidence is pretty strong



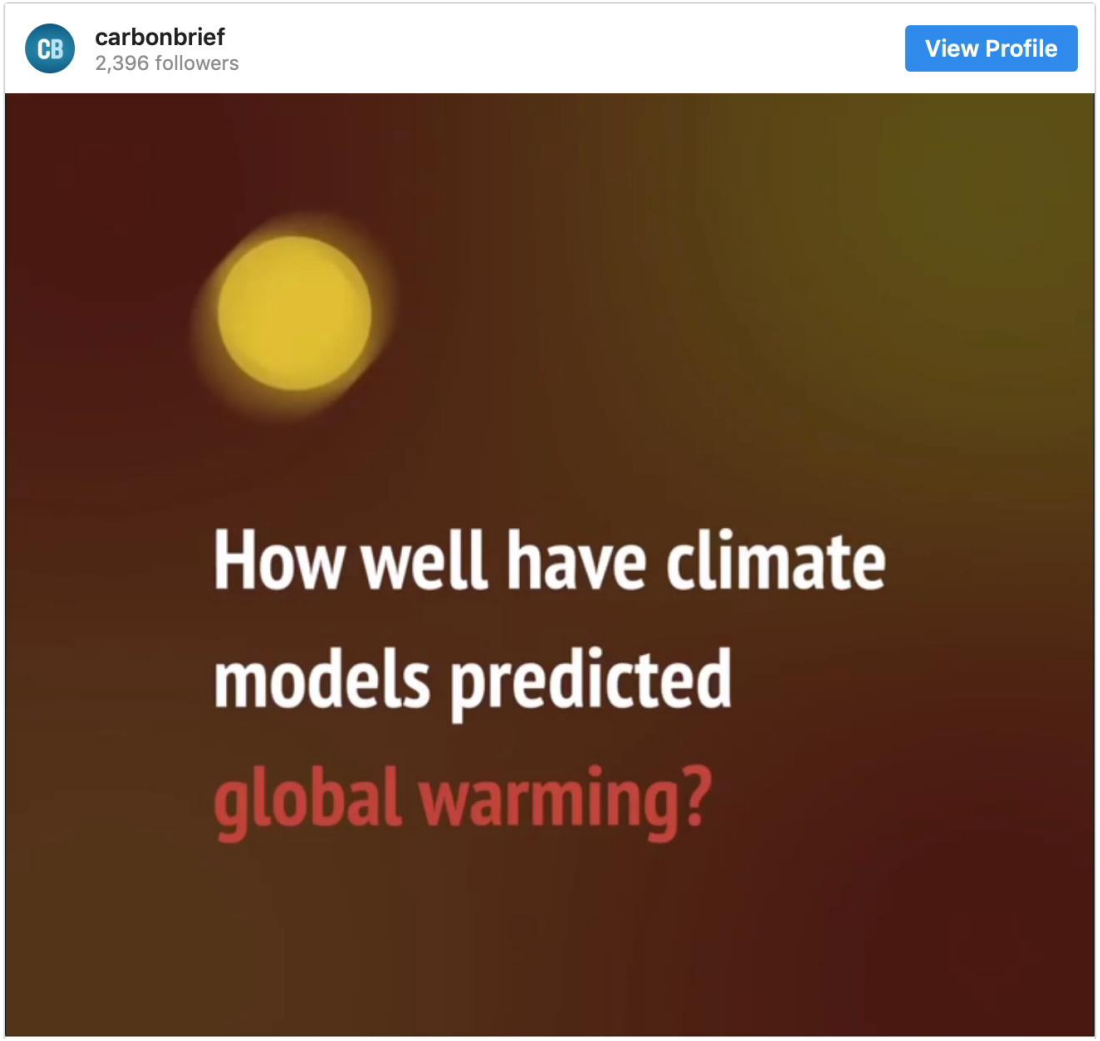
The New York Times/Larry Rohter

Cañon Zapata in Tijuana, Mexico, the busiest illegal crossing point.

Drought Raising Food Prices; Inflation Effect Seems Minor

By ROBERT D. HERSHEY Jr.
Special to The New York Times

How accurate are climate models?



CALL FOR POSTERS
Deadline: November 22

Partners: APHA · American Lung Association · Center for Earth Ethics

Healthcare Delivery and the Climate Crisis

Emily Senay, MD, MPH

Icahn School of Medicine at Mount Sinai

November 17th, 2019