Climate Justice
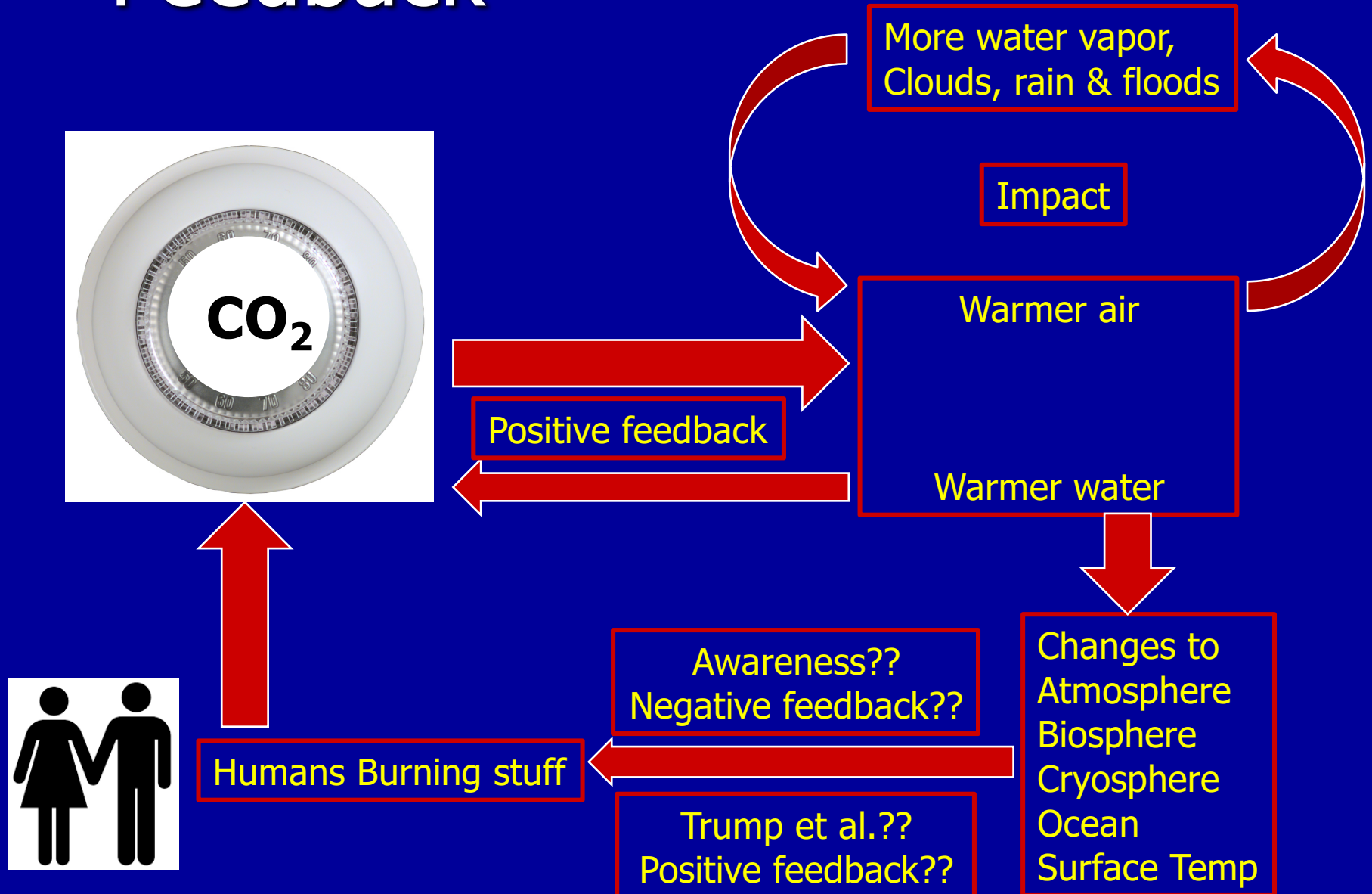
For Prof. Claude d'Estrée
University of Denver,
Korbel School of International Studies
April 13, 2017
JFOrmes@gmail.com

Feedback

CO$_2$

More water vapor,
Clouds, rain & floods

Impact

Warmer air

Positive feedback

Warmer water

Changes to
Atmosphere
Biosphere
Cryosphere
Ocean
Surface Temp

Awareness??
Negative feedback??

Trump et al.??
Positive feedback??

Humans Burning stuff

Knowledge *vs.* Belief

"Knowledge" – considered "content knowledge", "literacy" or "conceptual understanding" in science education circles.

- Facts, vocabulary, concepts, mental models are fundamental building blocks for understanding
  (and now computer simulations)
- Science, and scientists, build knowledge
- We are comfortable communicating it

"Belief" - Trust or confidence in some thing that is not immediately susceptible to rigorous proof

- Beliefs are strongly tied to what a person values, often with religious overtones.

- Scientists value science and knowledge created.

- Belief stems from one's knowledge, study and experience.

After notes by Prof. Steve Anderson, University of Northern Colorado

# Where to get reliable information about minimalist arguments:

See http://skepticalscience.com/argument.php
or see the blog at http://www.realclimate.org/

The human element

- Population
  - UN projections
- Affluence
  - Economics of growth
  - Closely correlated with energy use
- Attitudes
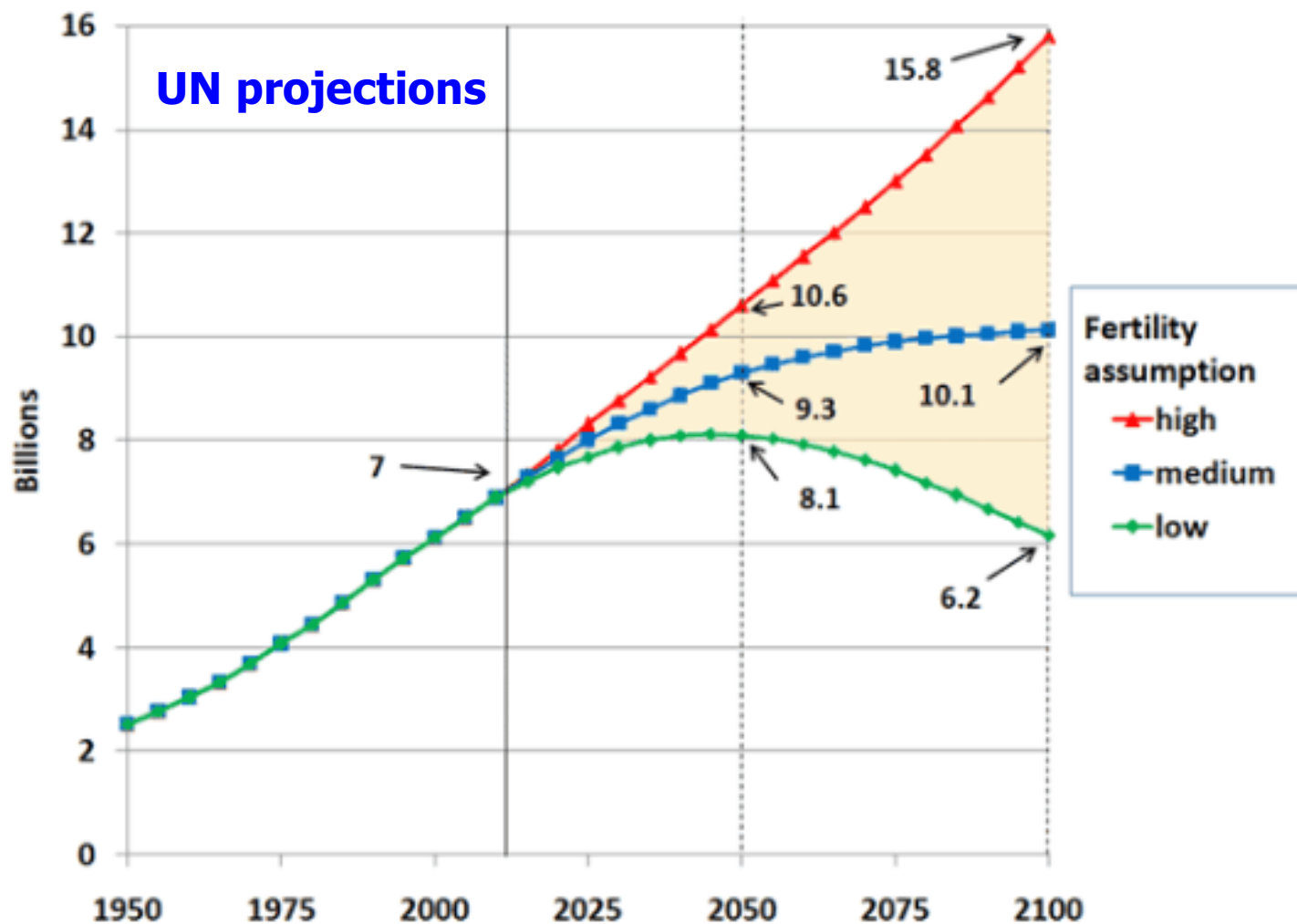 - Yale Project on Climate Change Communication
  - http://environment.yale.edu/climate-communication/

- "It's hard to make predictions, especially about the future."

  Lawrence Peter "Yogi" Berra
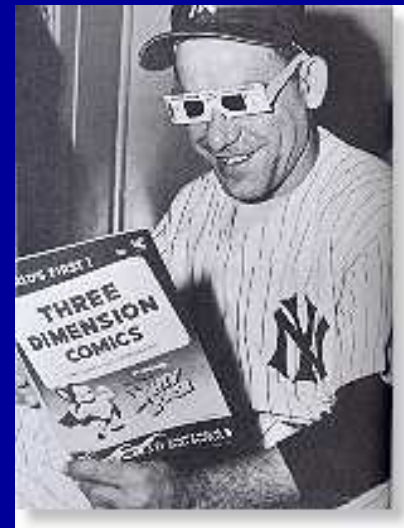
ZPG by 2040?? by 2100? never?

UN Projections of World Population Under Three Fertility Assumptions

UN projections

Fertility assumption
- high
- medium
- low

15.8
10.6
10.1
9.3
8.1
7
6.2

Just stabilizing the CO_2 emissions will be an enormous challenge!

**CO_2 emissions =
Carbon content of the Energy * Energy efficiency of economy
* Individual affluence * Population**

Population goes up (empower women). ↑

Can we get along with less individual wealth? Economic growth goes up to create prosperity and eliminate poverty (e.g. China). ↑

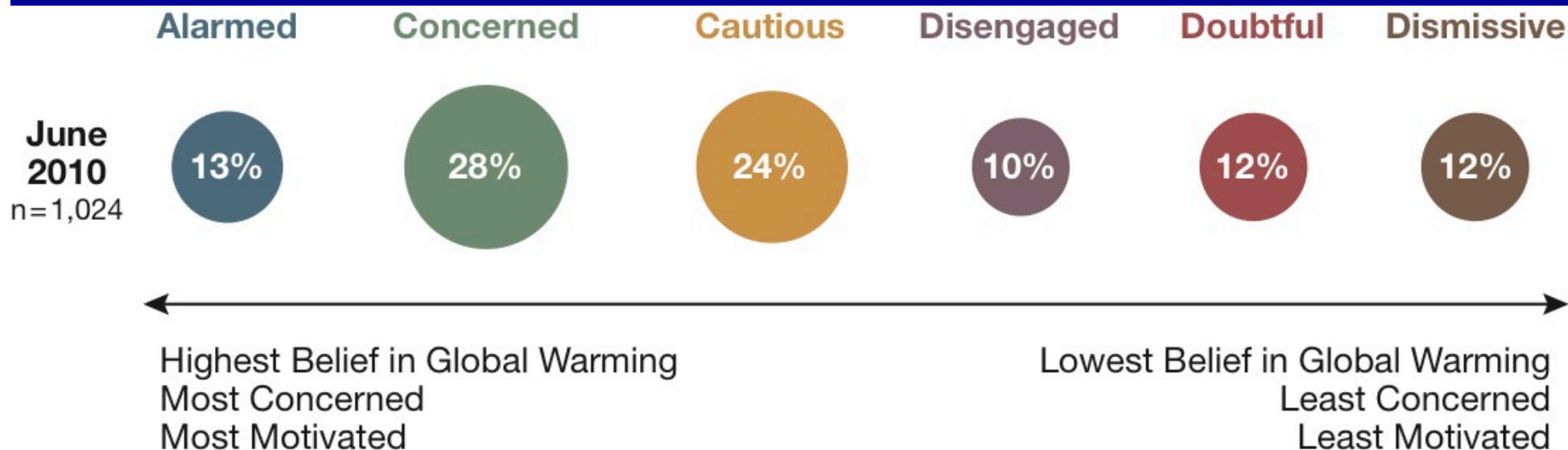**Run the economy on less energy (aka conservation). ↓**

Reduce the carbon content of the energy. ↓

Small subset of people

- Anti-action activitsts

- The anti science group

- Working for vested interests trying to avoid or delay government action to try and do something to ameliorate the problem

- Tobacco industry example

Where are you on this scale?

Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive

June
2010
n=1,024

| 13% | 28% | 24% | 10% | 12% | 12% |

Highest Belief in Global Warming
Most Concerned
Most Motivated

Lowest Belief in Global Warming
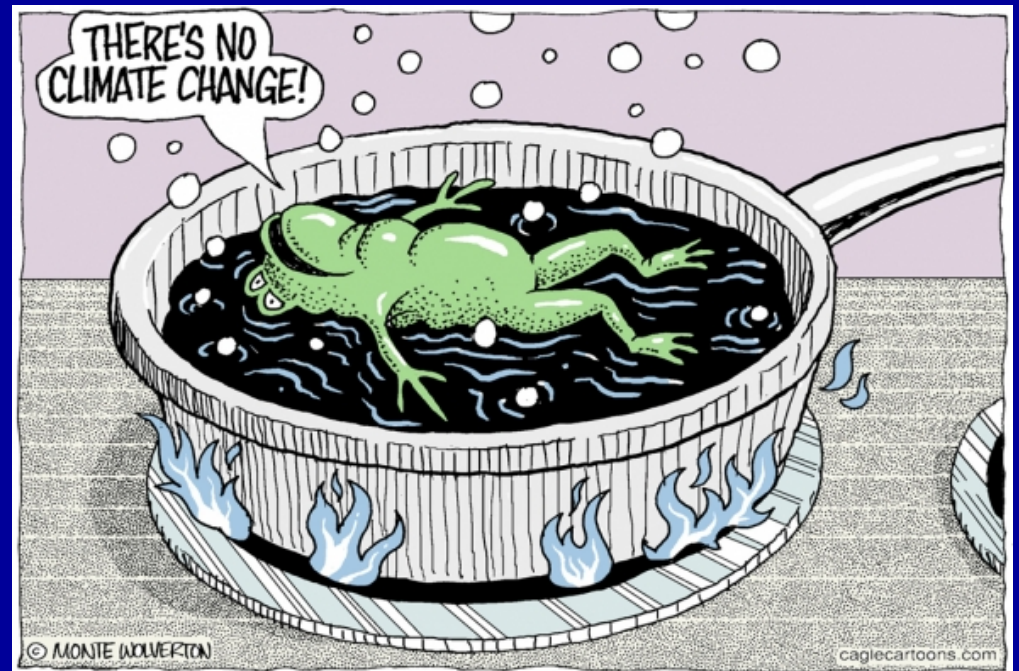Least Concerned
Least Motivated

Proportion represented by area

Source: Yale Project on Climate Change Communication

If you are willing, please write the word that describes you personally on a piece of paper and put it in the basket as it goes around.
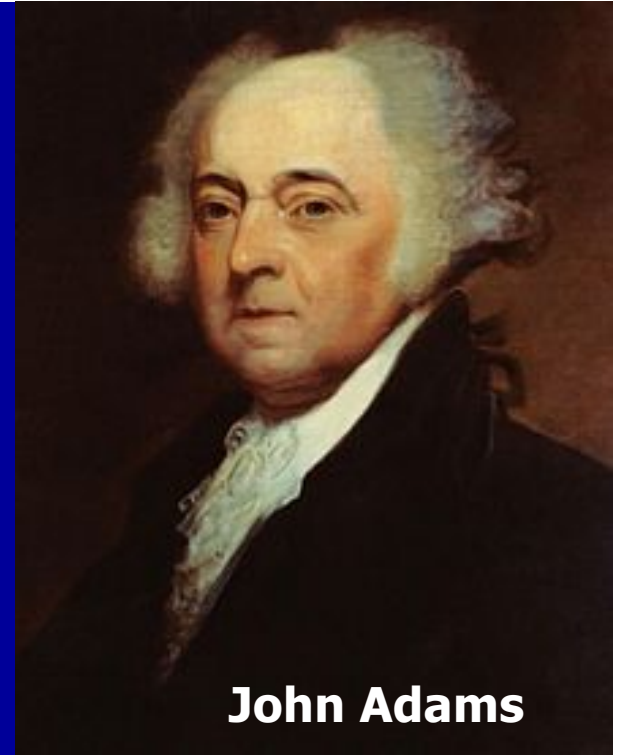
Do not put you name – this is an anonymous survey.

Will humans be like the frog?

People will "get it".

John Adams

Often quoted

"Facts are stubborn things; and whatever may be our wishes, our inclinations, or the dictates of our passion, they cannot alter the state of facts and evidence."

John Adams, US diplomat & politician (1735 - 1826)

'Argument in Defense of the Soldiers in the Boston Massacre Trials,' Dec. 1770
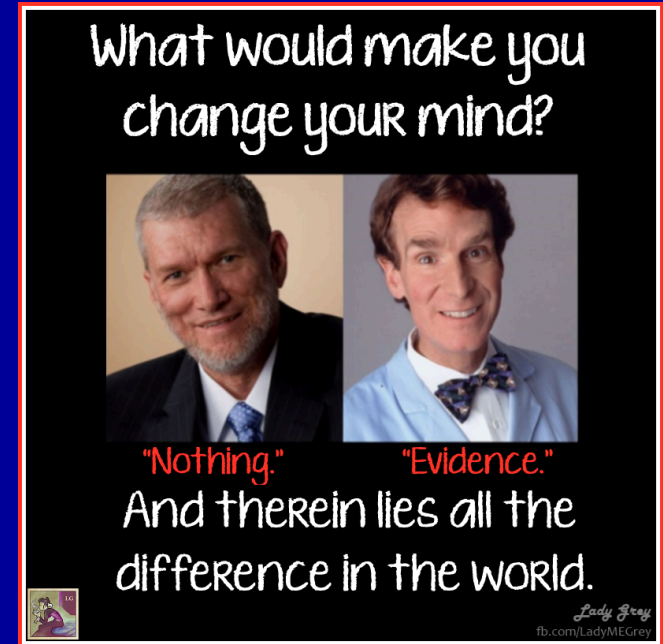
Distrust of science

Huffington Post Poll 12/21/2013

Percent	Trust
• 36%	• a lot
• 51%	• a little
• 6%	• none
• 7%	• no response

What would make you change your mind?

"Nothing."   "Evidence."

And therein lies all the difference in the world.

fb.com/LadyMEGrey

See Shawn Otto, 2011 *Fool Me Twice: Fighting The Assault On Science In America*' (Rodale Books), especially Chapter 7, American Antiscience.

Conservatives: Fundamentalism and the religious right, evangelicals, creationists, biblical literalists, etc.
Liberals: Postmodernism, "no such thing as objective truth", "New age" thinking, alternative realities, etc.

Why can't we convince everyone about climate change?

For this see the book

Don't Even Think About It; Why Our Brains Are Wired to Ignore Climate Change

by George Marshall

(2014, Bloomsbury)

It's a fascinating read and sociologically important.

"PLEASE READ THIS BOOK, AND THINK ABOUT IT. LET'S GET TO WORK." —BILL NYE

DON'T EVEN THINK ABOUT IT

WHY OUR BRAINS ARE WIRED TO IGNORE CLIMATE CHANGE

GEORGE MARSHALL
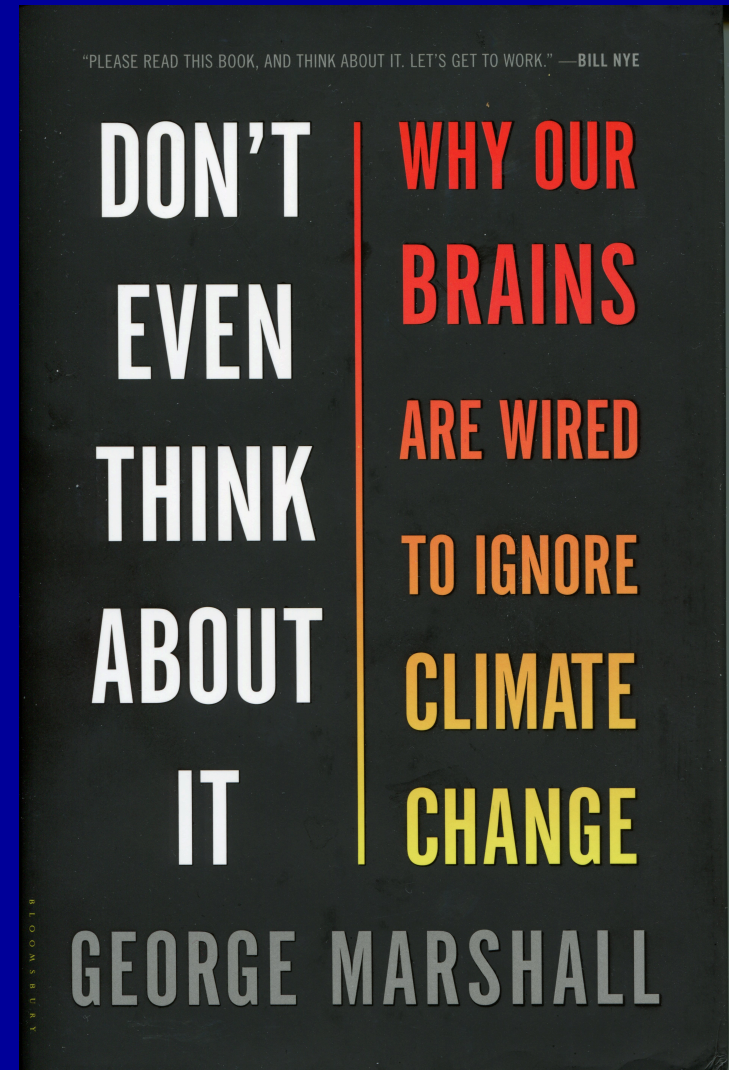
denier, noun

1. a unit of weight by which the fineness of silk, rayon, or nylon yarn is measured, equal to the weight in grams of 9,000 meters of the yarn and often used to describe the thickness of hosiery.

   – "840 denier nylon"

2. *historical* a French coin, equal to one twelfth of a sou, which was withdrawn from use in the 19th century.

3. a person who denies something.

   – "a prominent denier of global warming"

FIGURE 1. Crude death rate* for infectious diseases — United States, 1900–1996[†]
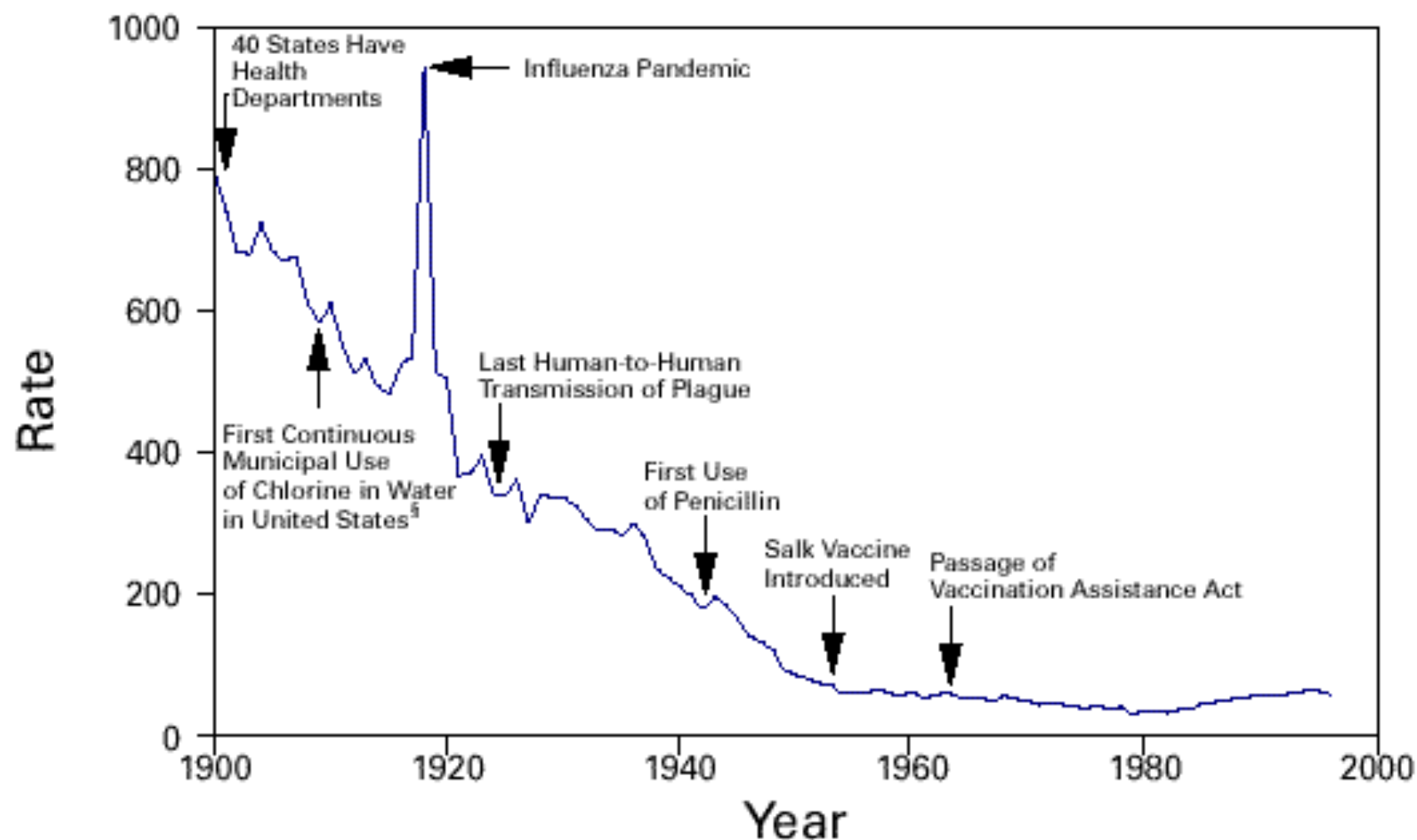
*Per 100,000 population per year.
[†]Adapted from Armstrong GL, Conn LA, Pinner RW. Trends in infectious disease mortality in the United States during the 20th century. JAMA 1999:281;61–6.
[§]American Water Works Association. Water chlorination principles and practices: AWWA manual M20. Denver, Colorado: American Water Works Association, 1973.
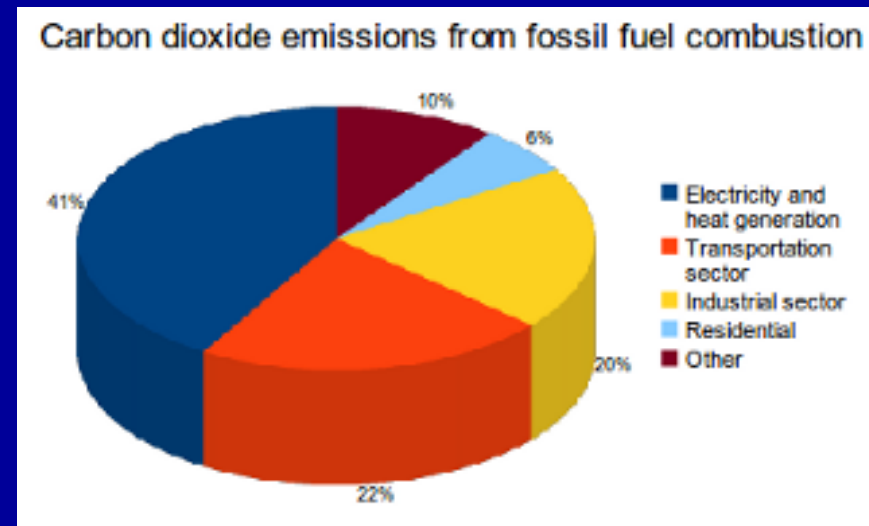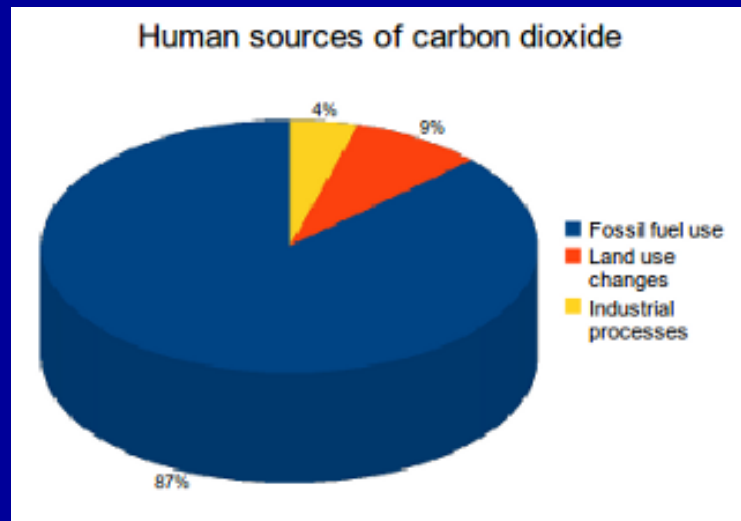
CO_2 as waste

Atmosphere ("global commons") waste dump

- Solid waste produced annually about 1 billion metric tons

- Fossil fuel burning -> 30 billion metric tons/year
  $$(30 \times 10^9)/(300 \times 10^6) = 100$$
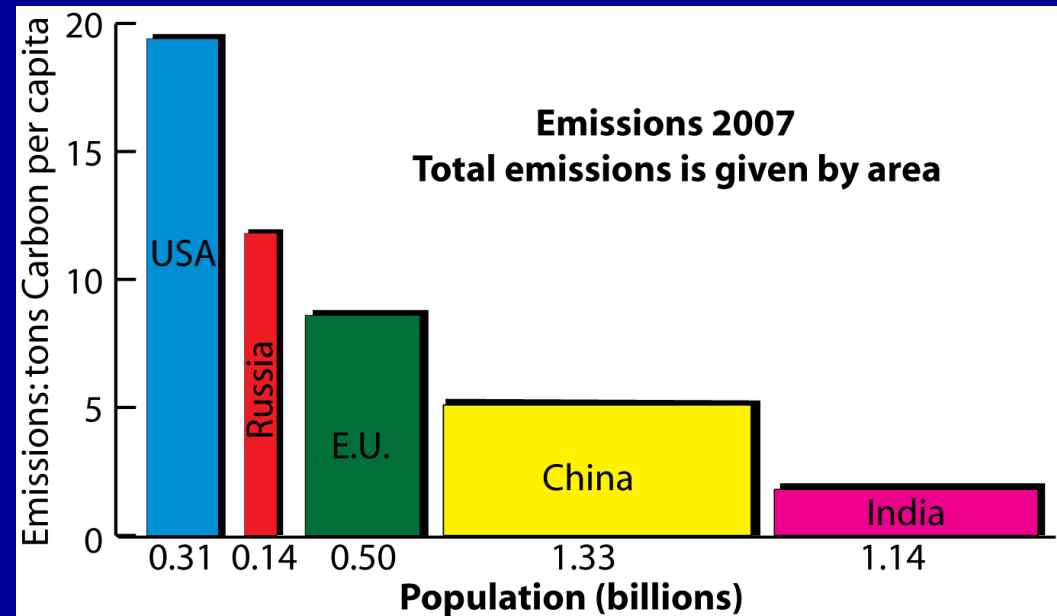
Anthropogenic Sources of CO$_2$

Human sources of carbon dioxide
- Fossil fuel use
- Land use changes
- Industrial processes

4% | 9% | 87%

Carbon dioxide emissions from fossil fuel combustion
- Electricity and heat generation
- Transportation sector
- Industrial sector
- Residential
- Other

41% | 10% | 6% | 20% | 22%

http://www.iea.org/publications/freepublications/publication/CO2emissionfromfuelcombustionhighlightsMarch2013.pdf or
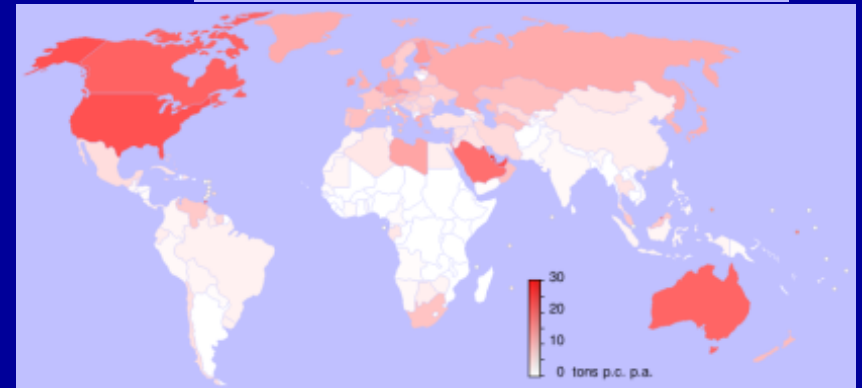http://whatsyourimpact.org/greenhouse-gases/carbon-dioxide-sources

2007 emissions: Population matters!

China biggest emitter

- 14% more than US

- Per capita .... Pop.

	Per capita	Pop.
U.S.:	19.4	0.31
Russia:	11.8	0.14
E. U.:	8.6	0.50
China:	5.1	1.33
India:	1.8	1.14
	tons	Billions

Netherlands Environmental Assessment Agency 2008

Emissions 2007
Total emissions is given by area

Emissions: tons Carbon per capita

USA — Russia — E.U. — China — India

Population (billions): 0.31 0.14 0.50 1.33 1.14

Tons of CO_2 per capita

30
20
10
0 tons p.c. p.a.

Compare 2007 and 2015 emissions:

China biggest emitter

- 14% more than US

Per capita		Pop.
U.S.:	19.4	0.31
Russia:	11.8	0.14
E. U.:	8.6	0.50
China:	5.1	1.33
India:	1.8	1.14
	tons	Billions

China biggest emitter

- 75% more than US

Per capita		Pop.
U.S.:	19.8	0.32
Russia:	16.2	0.14
E. U.:	8.8	0.50
China:	8.1	1.37
India:	2.4	1.25
	tons	Billions

Times of India

Tons of CO_2 per capita
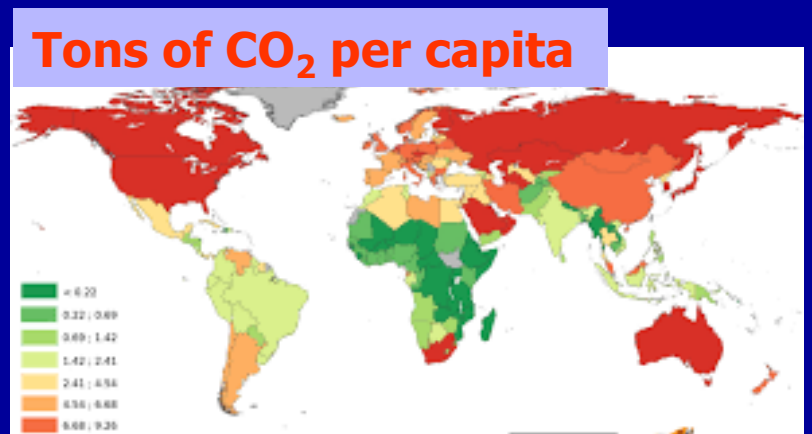
It wasn't ants, or apes or elephants

Inequality of Consumption, 2005

Share of World's private consumption (%)

Values by World Population Decile:
- 1: 0.5
- 2: 1.0
- 3: 1.4
- 4: 1.9
- 5: 2.4
- 6: 3.3
- 7: 4.8
- 8: 8.1
- 9: 17.6
- 10: 59.0

World Population Decile
(e.g. 1 = poorest 10%, 2 = poorest 11-20%)
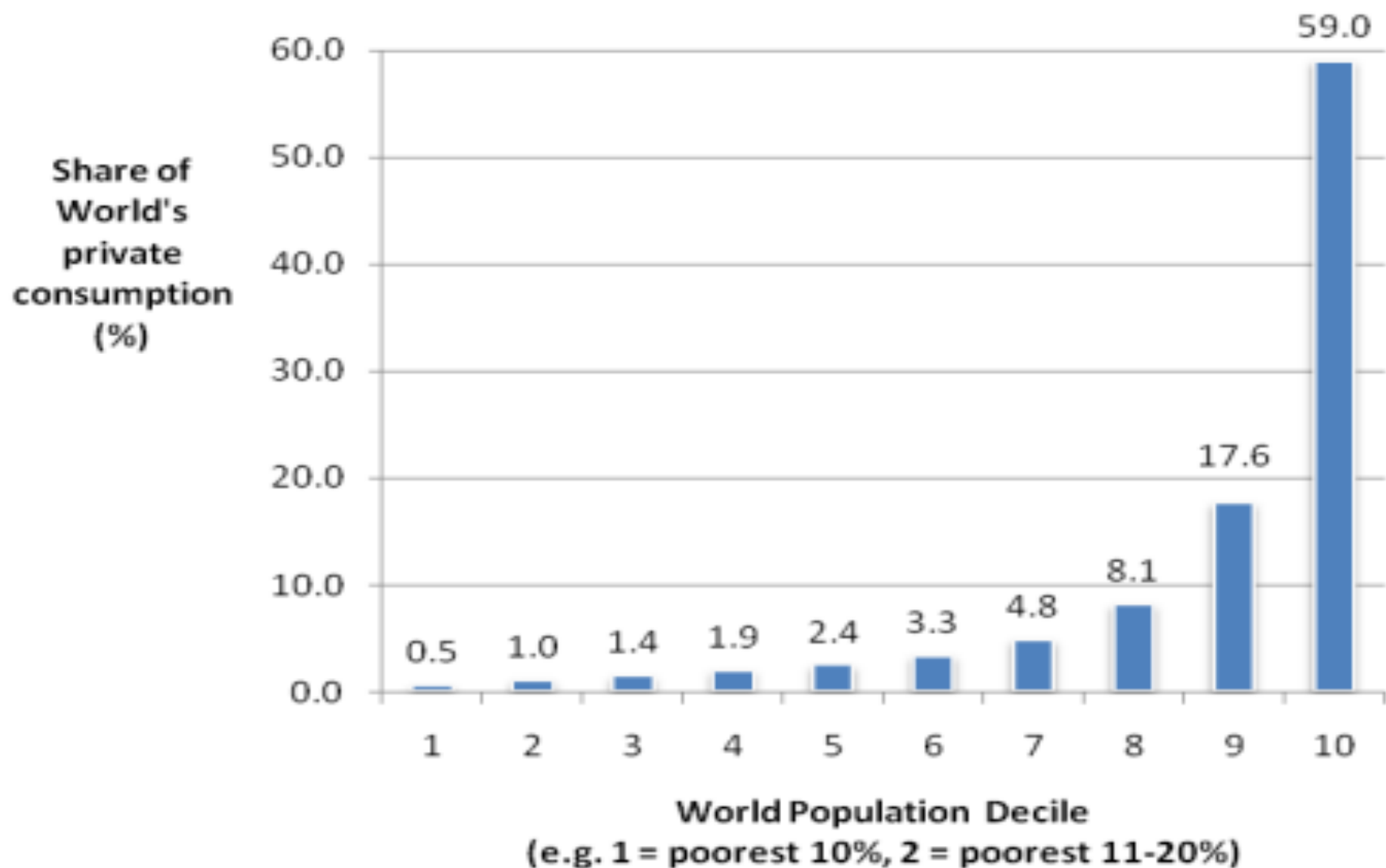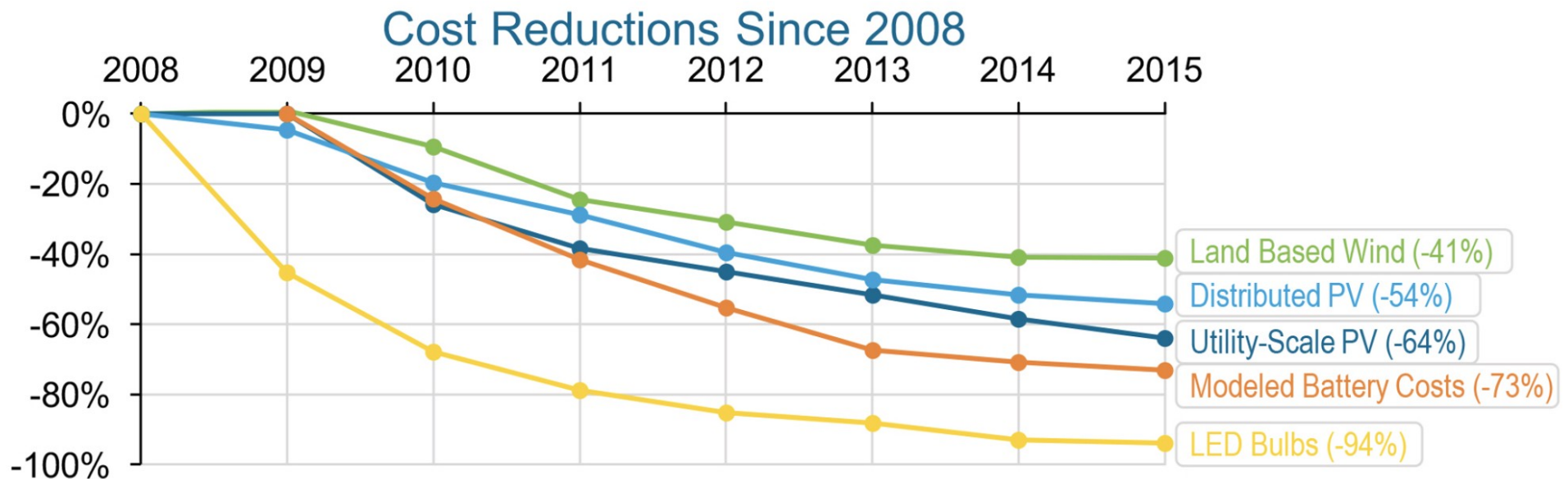
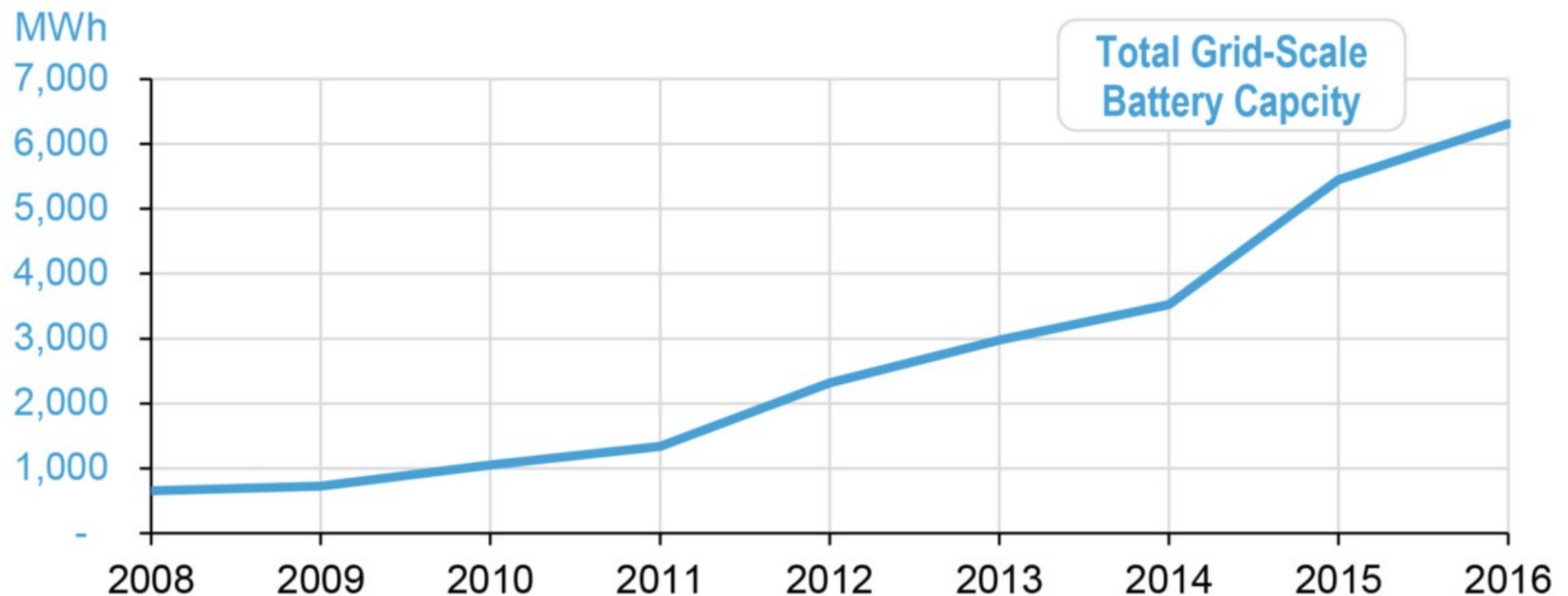Source: World Bank Development Indicators 2008

Why it's not hopeless

- Chart of the year: 'Incredible' price drops jumpstart clean energy revolution
  - New DOE report details latest advances in solar, wind, LED lights, batteries, and electric cars.

Cost Reductions Since 2008

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |

Land Based Wind (-41%)
Distributed PV (-54%)
Utility-Scale PV (-64%)
Modeled Battery Costs (-73%)
LED Bulbs (-94%)

Why it's not hopeless

Supercharging the Grid with Batteries

DOE projects "the total domestic energy storage market could be worth $2.9 billion by 2021, as compared to $350 million in 2015."

Good news

In 2010, more was invested in renewables than in extracting more ancient hydrocarbons, globally.

- Renewable: $187 billion
- Ancient hydrocarbons: $157 billion

http://www.bloomberg.com/news/articles/2011-11-25/fossil-fuels-beaten-by-renewables-for-first-time-as-climate-talks-founder

Climate Organizations

- Citizens Climate Lobby (CCL)
- 350.org (Bill McKibben)
- Sierra Club
- Union of Concerned Scientists
- Colorado Renewable Energy Society (CRES)
- Alliance for Sustainable Colorado
- Greenpeace
- Idle No More (mostly Canadian)

Paul's Letter to the Galatians 6:9

"And let us not be weary in doing good, for in due season we shall reap, if we faint not."