

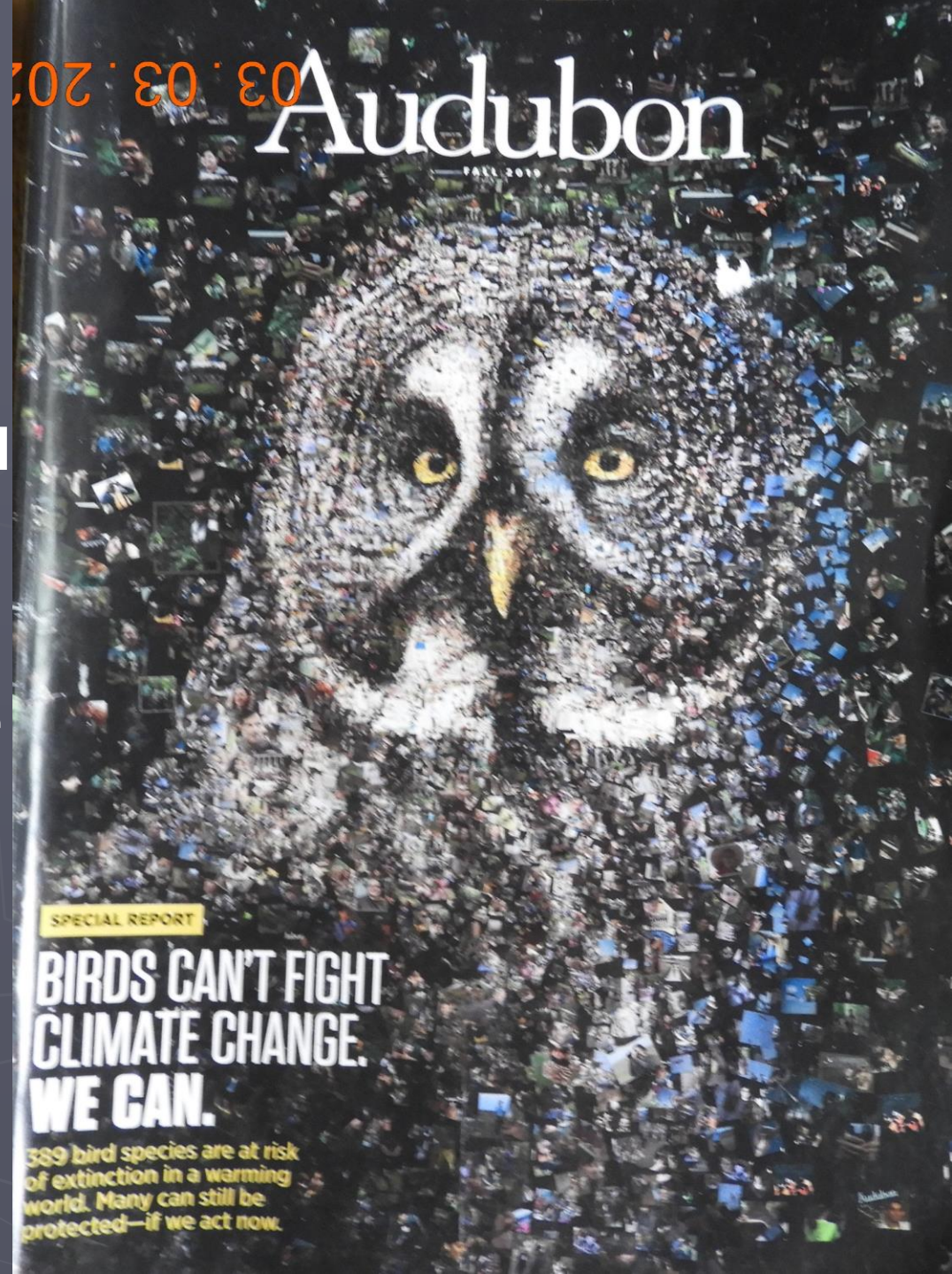
# Learning to Fight *the Climate Crisis*



Susan M. Schneider, PhD

**Audubon's 2019 Fall  
Climate Issue won a  
National Magazine Award**

**It's online at:  
<https://www.audubon.org/climate-action-guide>**



# Your Guide to Climate Action

Feeling like you can't make a difference? That couldn't be further from the truth. Here's where to begin and how to amplify your efforts to make lasting change in the world.

START THE CONVERSATION



1

LEAD YOUR COMMUNITY



2

REBUILD THE MACHINERY



3

JOIN A NATIONAL CAUSE



4



## Climate Action Guide

# Create a More Climate-Friendly Yard

America's largest irrigated crop isn't corn or soy—it's grass.



https://www.audubon.org/climate-action-guide



Most Visited

Other Bookmarks



Climate Action Guide

## Why Towns Should Prepare for the Climate Displaced

Climate change is already causing people to relocate. As more hometowns become inhospitable, yours might be able to help.



Climate Action Guide

## How to Hack Your Local Food System to Prevent Waste

Farm-to-table is the buzzword, but too often farm-to-landfill is the reality.



Climate Action Guide

## Why You Should Support Green Infrastructure

By working with nature, not against it, we can mitigate climate disasters while creating vital habitat.



# **California Audubon Chapters**

**A proud history of  
Audubon Advocacy Day  
at the state capitol**

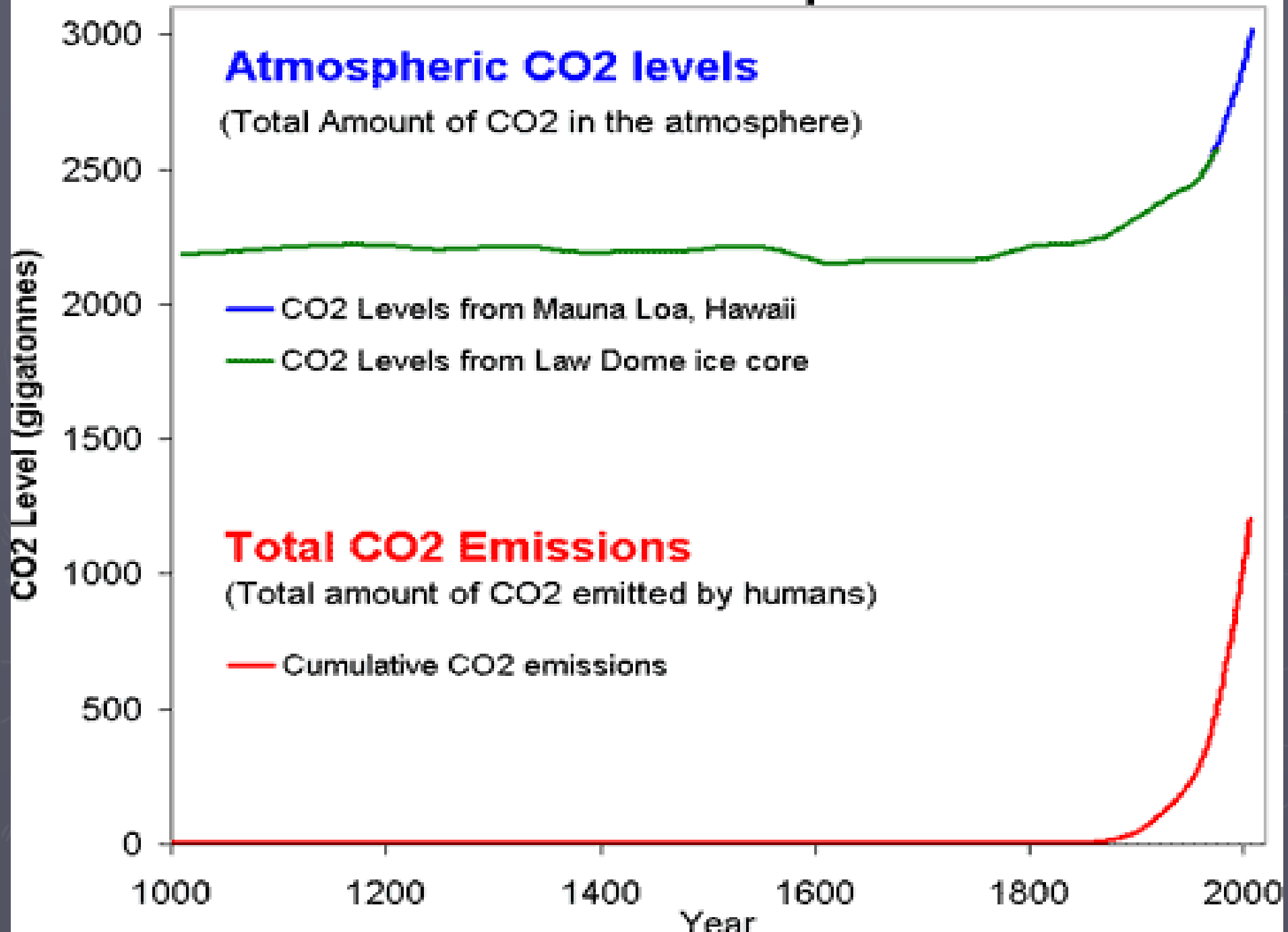
# IPCC October 2018 Report

## A Clarion Call

"The impact of human-induced warming is worse than previously feared, and only drastic coordinated action will keep the damage short of catastrophe."

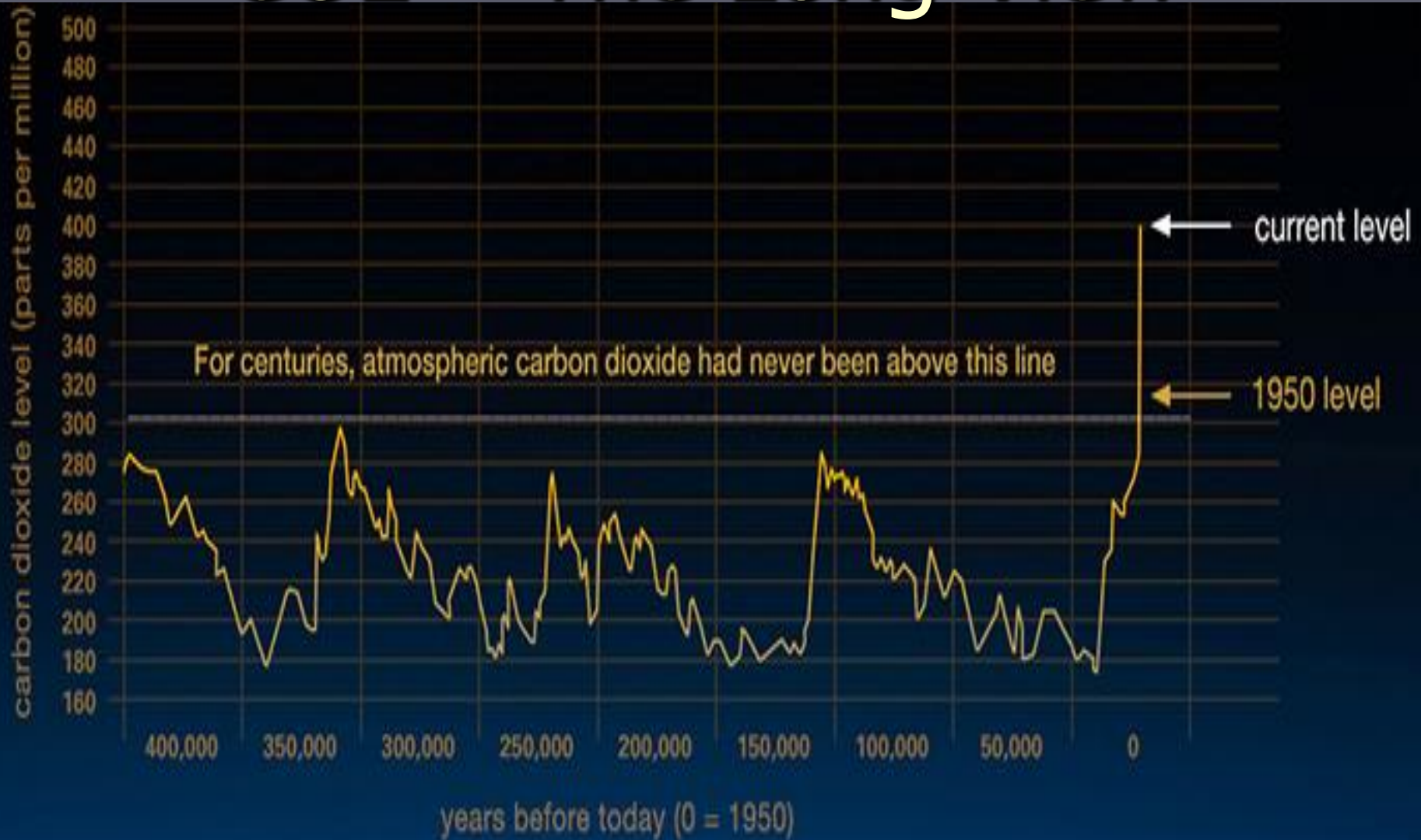
**The world faces  
a \*10-year\* deadline**

# CO2 emissions vs Atmospheric CO2 Levels





# CO2 – The Long View



Source: NASA

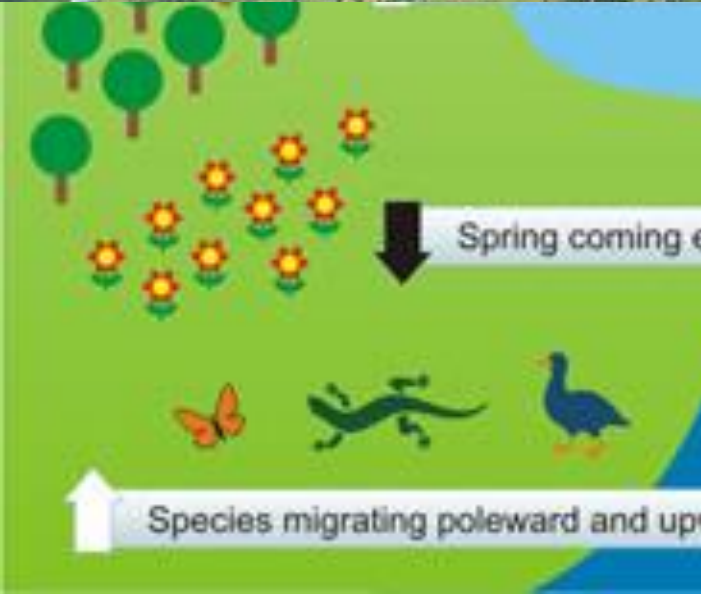
# The Consensus

97 out of 100 climate experts think humans are changing global temperature



**Recent survey:  
Only 15% of the US public knows this**

# Indicators of a Warming World

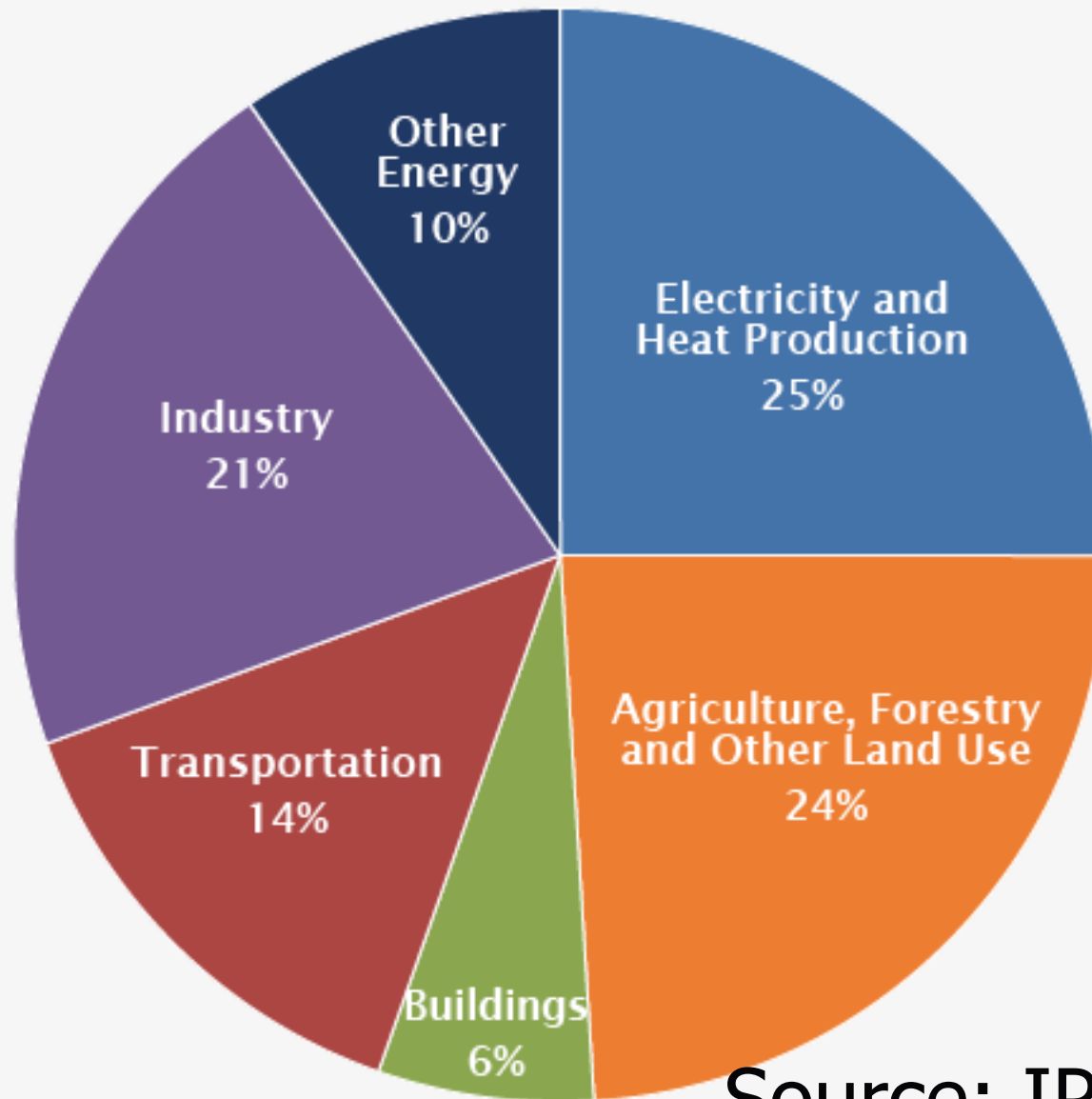


# Wildlife at Risk: The Sixth Great Extinction



Nearly half of our coral reefs are already gone.

# Global Greenhouse Gas Emissions by Economic Sector



Source: IPCC

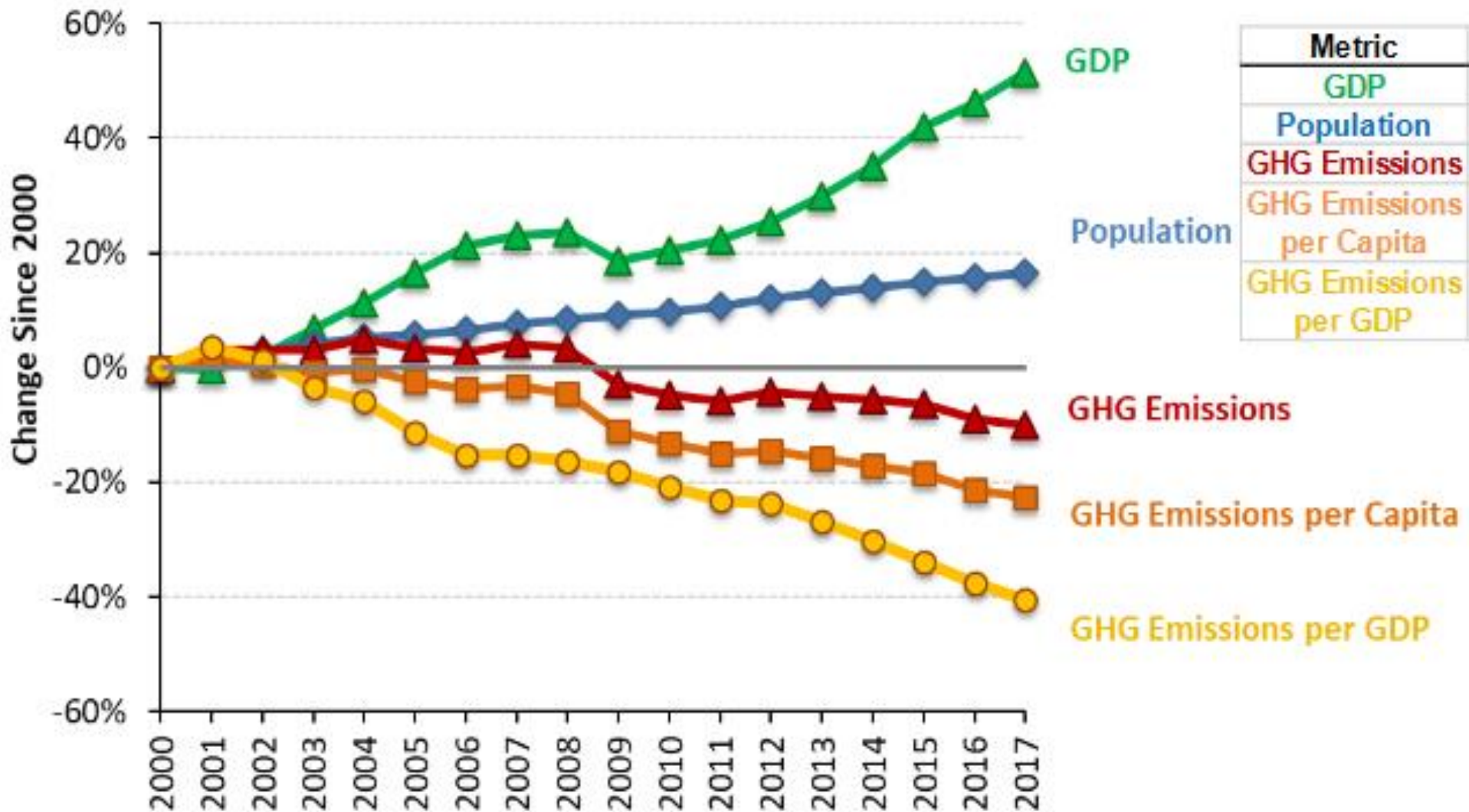
# Carbon Footprints

India:	2 tons CO <sub>2</sub> e per capita
China:	6 tons
Sweden:	7 tons
UK:	8 tons
Germany:	11 tons
Australia:	16 tons
Canada:	16 tons
US:	<b>18 tons</b>



US Department of Energy/  
UN/Global Carbon Project

Figure 2a. Change in California GDP, Population, and GHG Emissions Since 2000



# Climate Change Websites



## Skeptical Science

Getting skeptical about global warming skepticism



Home Arguments Software Resources Comments The Consensus Project Translations About Donate

Search...



### MOST USED Climate Myths

and what the science really says...

- 1 Climate's changed before
- 2 It's the sun
- 3 It's not bad
- 4 There is no consensus
- 5 It's cooling
- 6 Models are unreliable
- 7 Temp record is unreliable
- 8

## Explaining climate change science & rebutting global warming misinformation

Scientific skepticism is healthy. Scientists should always challenge themselves to improve their understanding. Yet this isn't what happens with climate change denial. Skeptics vigorously criticise any evidence that supports man-made global warming and yet embrace any argument, op-ed, blog or study that purports to refute global warming. This website gets skeptical about global warming skepticism. Do their arguments have any scientific basis? What does the peer reviewed scientific literature say?

**Newcomers, start here** | **History of Climate Science** (1930, 1940, 1950, 1960) | **The Big Picture**

## Rising CO2 levels could push 'hundreds of millions' into malnutrition by 2050

Posted on 5 September 2018 by Guest Author

Winner of the 2011



**Eureka Prize**  
Advancement of climate change knowledge

Climate Science **CROWD SOURCING FUNDING**



# Climate Change E-Newsletters



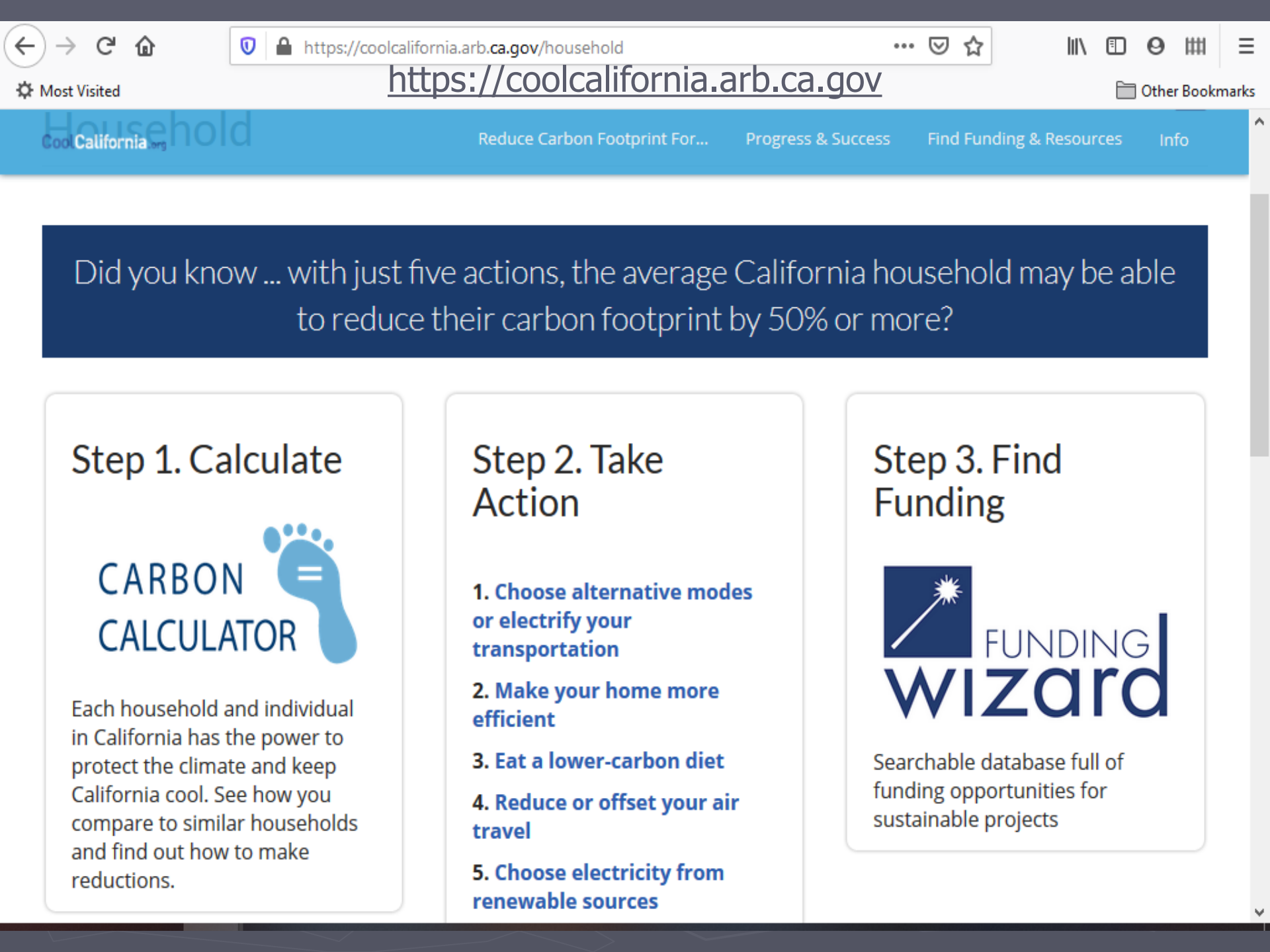
YALE  
Climate  
Connections

- Yale Climate Connections
- World Resources Institute

\*\*\*\*\*

- and Website

CoolCalifornia.arb.ca.gov  
for Households, Small Business,  
Schools, Local Government



Did you know ... with just five actions, the average California household may be able to reduce their carbon footprint by 50% or more?

## Step 1. Calculate



Each household and individual in California has the power to protect the climate and keep California cool. See how you compare to similar households and find out how to make reductions.

## Step 2. Take Action

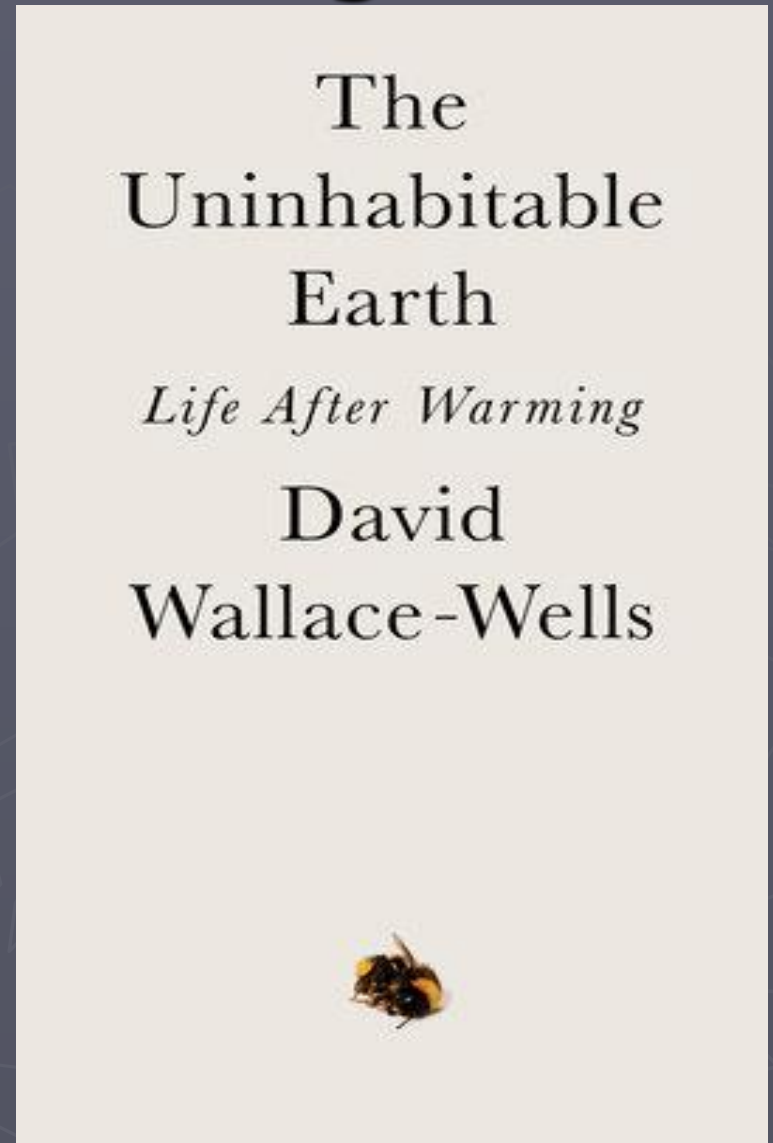
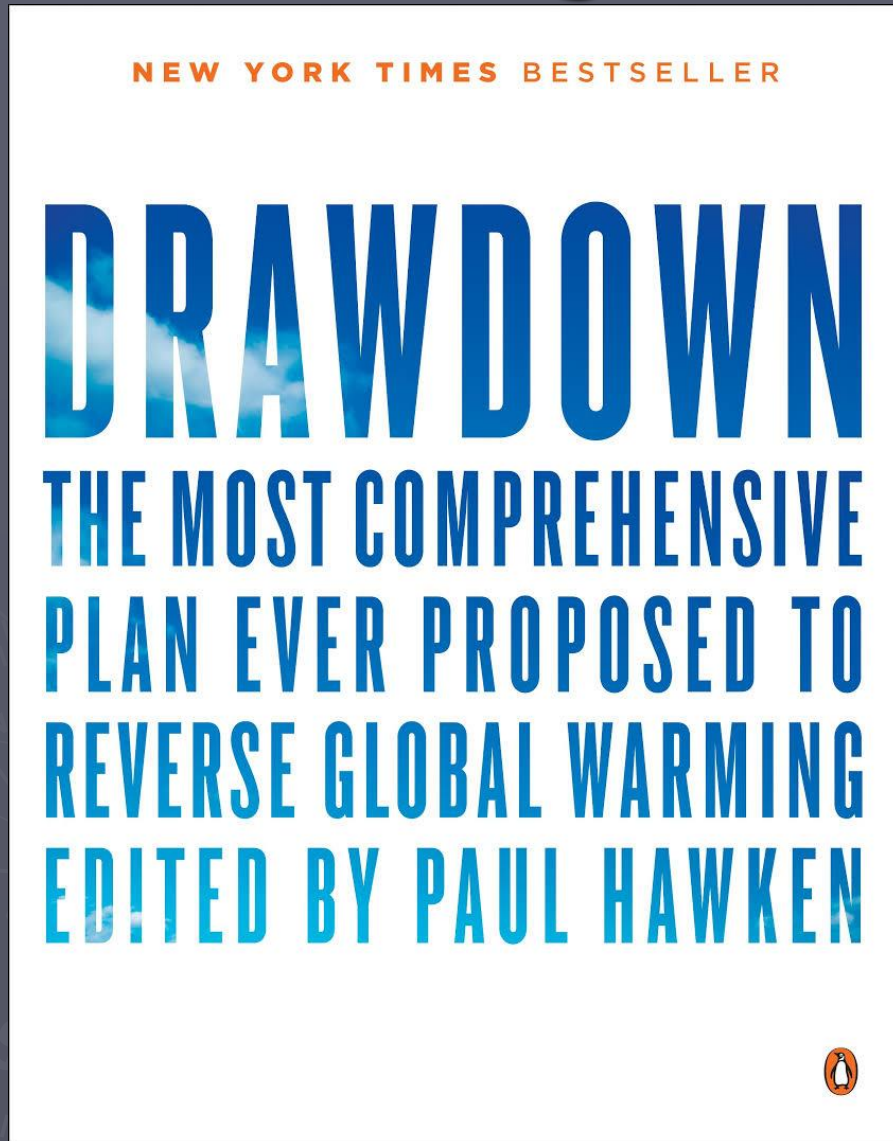
1. Choose alternative modes or electrify your transportation
2. Make your home more efficient
3. Eat a lower-carbon diet
4. Reduce or offset your air travel
5. Choose electricity from renewable sources

## Step 3. Find Funding



Searchable database full of funding opportunities for sustainable projects

# Outstanding Climate Change Books



Annotated list at [www.scienceofconsequences.com](http://www.scienceofconsequences.com)

# Outstanding Climate Change Books

'Enjoyable, fun to read and scientifically robust.  
A triumph of popular science writing.'

Chris Goodall, author, *Ten Technologies to Fix Energy and Climate*



THE CARBON FOOTPRINT  
OF EVERYTHING

MIKE BERNERS-LEE

Foreword by Bill McKibben

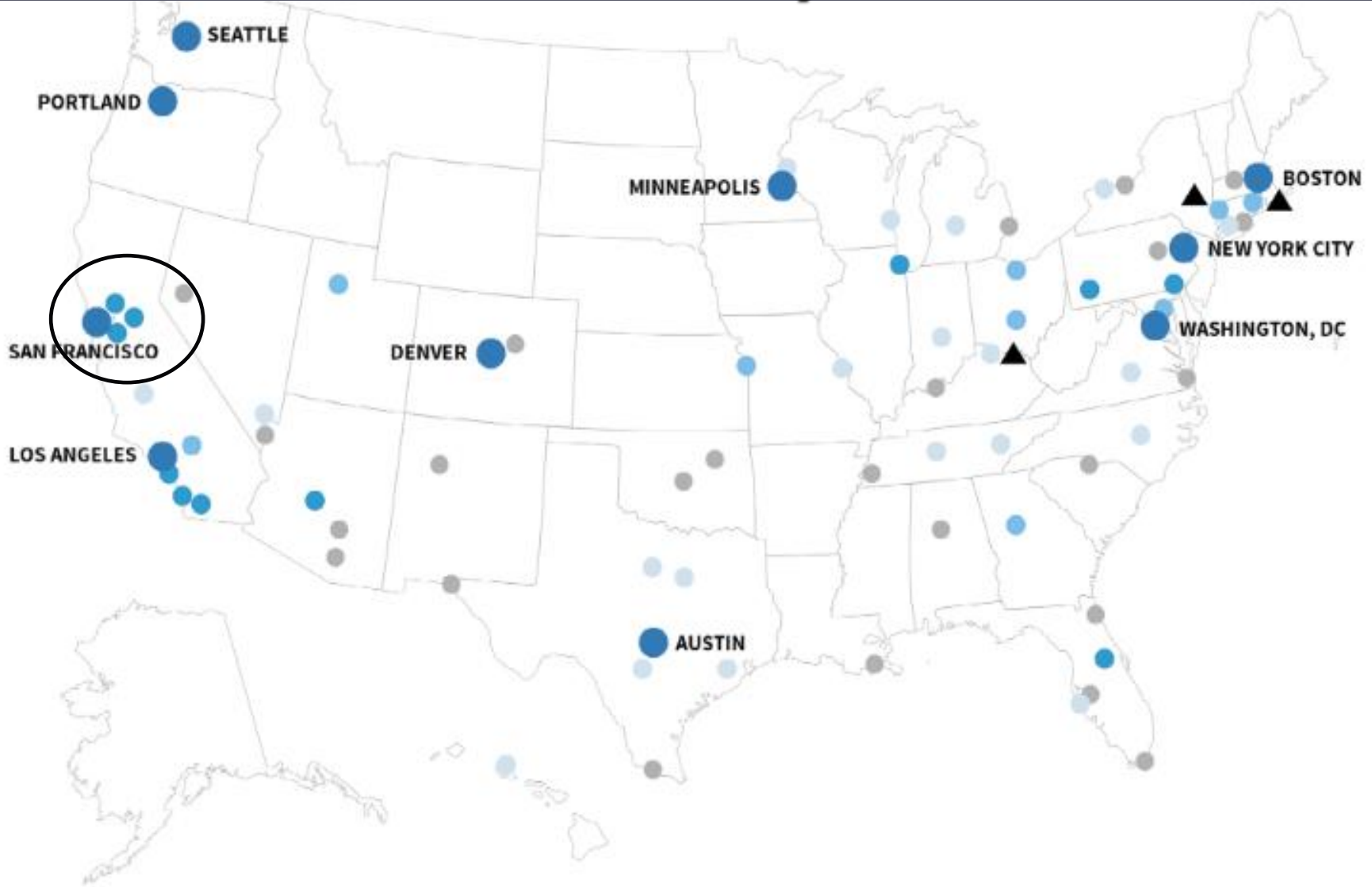
## THE PARENTS' GUIDE TO CLIMATE REVOLUTION

**100 WAYS** TO BUILD  
A FOSSIL-FREE FUTURE,  
RAISE EMPOWERED KIDS,  
AND STILL GET A GOOD  
NIGHT'S SLEEP

MARY DEMOCKER



# 2019 ACEEE City Scorecard



## Top 10 Cities

1. Boston
2. San Francisco

## 11-20

11. San José
12. Oakland

## 21-30

22. Atlanta
23. Kansas City

## 31-50

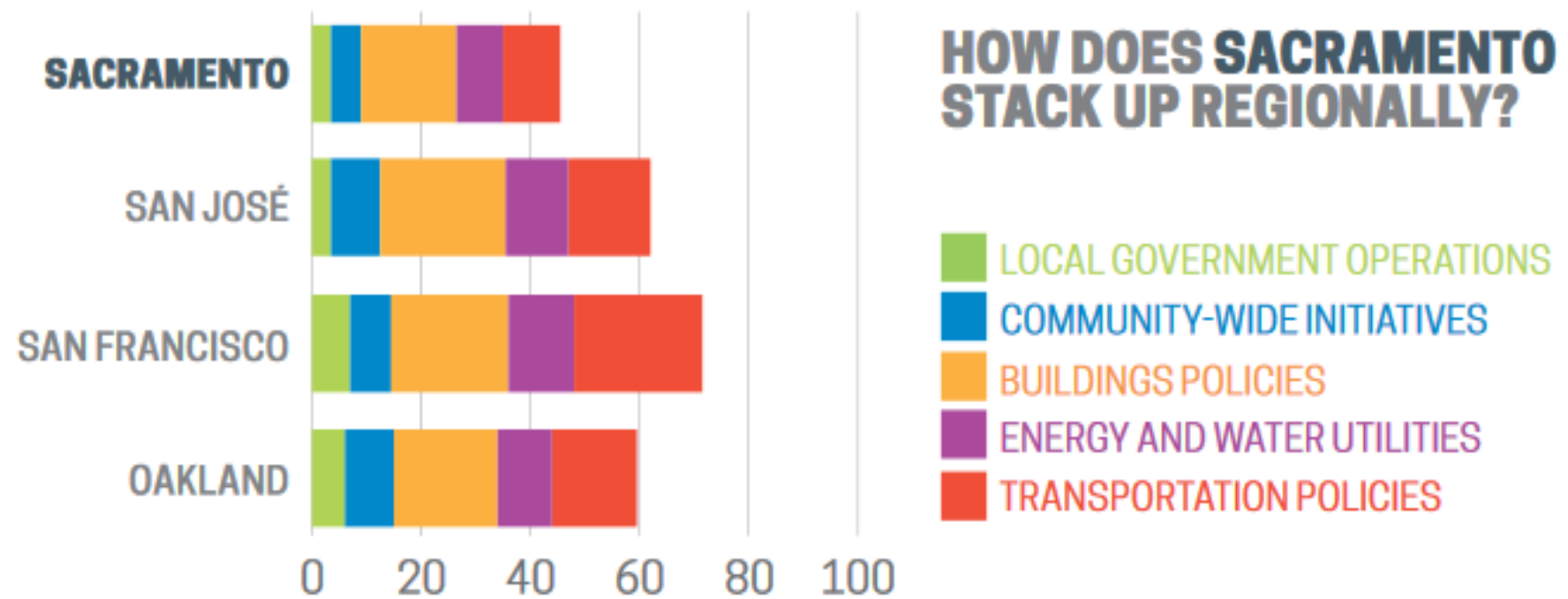
31. St. Paul
32. San Antonio

42. Bridgeport, CT
43. Knoxville

## 51-75

51. New Haven
52. New Orleans
63. Virginia Beach
63. Aurora

# 2019 ACEEE City Scorecard



- Buildings/Transport Progress
- Work on all, especially Local Government Ops, Community

# Good News/Bad News

- Knowledge and technology
- Huge financial savings
- Big obstacles



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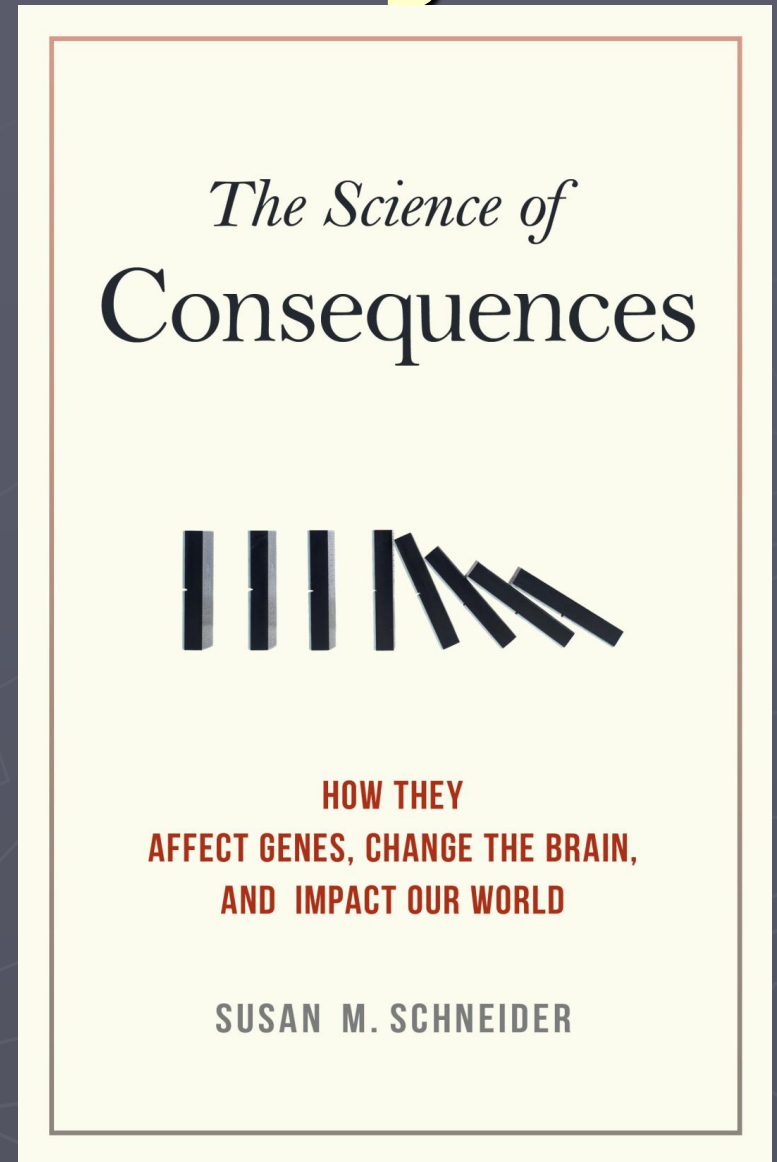
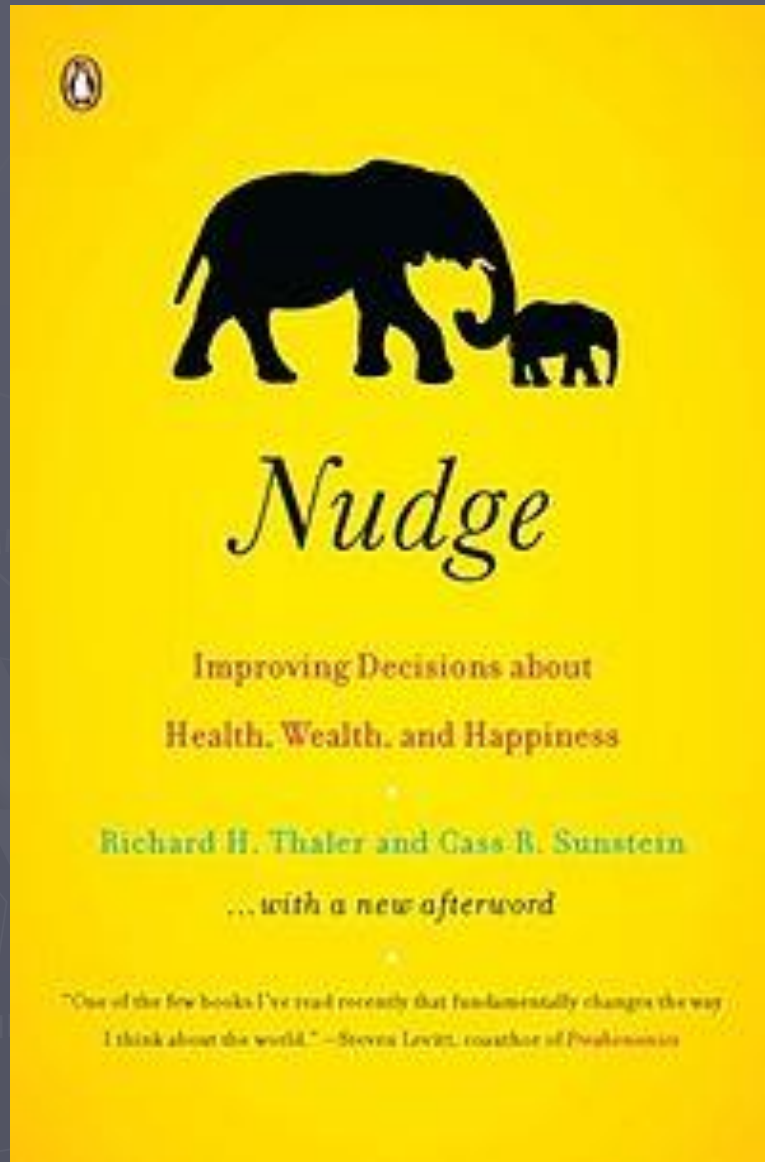
The best science and technology  
doesn't help us if we don't use it

# Policy



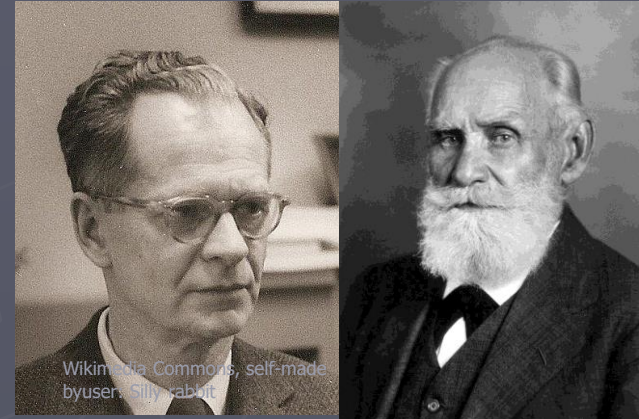


# Behavioral Economics for Behavior Change



# Learning Principles

- A century of research
- Well-quantified
- Extensive application
- Awesome generality:  
hundreds of species
- Advanced neurophysiological and  
genetic understanding



# American Psychological Association Task Force

## Major Barriers

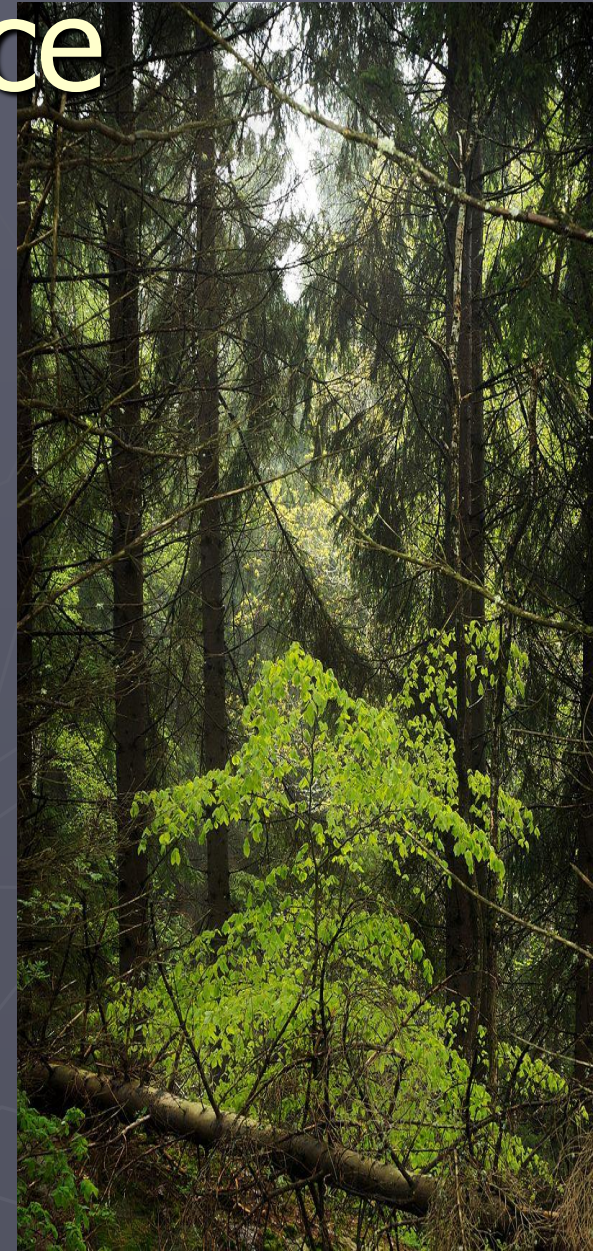
Old Habits

A Sense of Futility

Ideally: New **green** habits

New social norms

Natural rewards



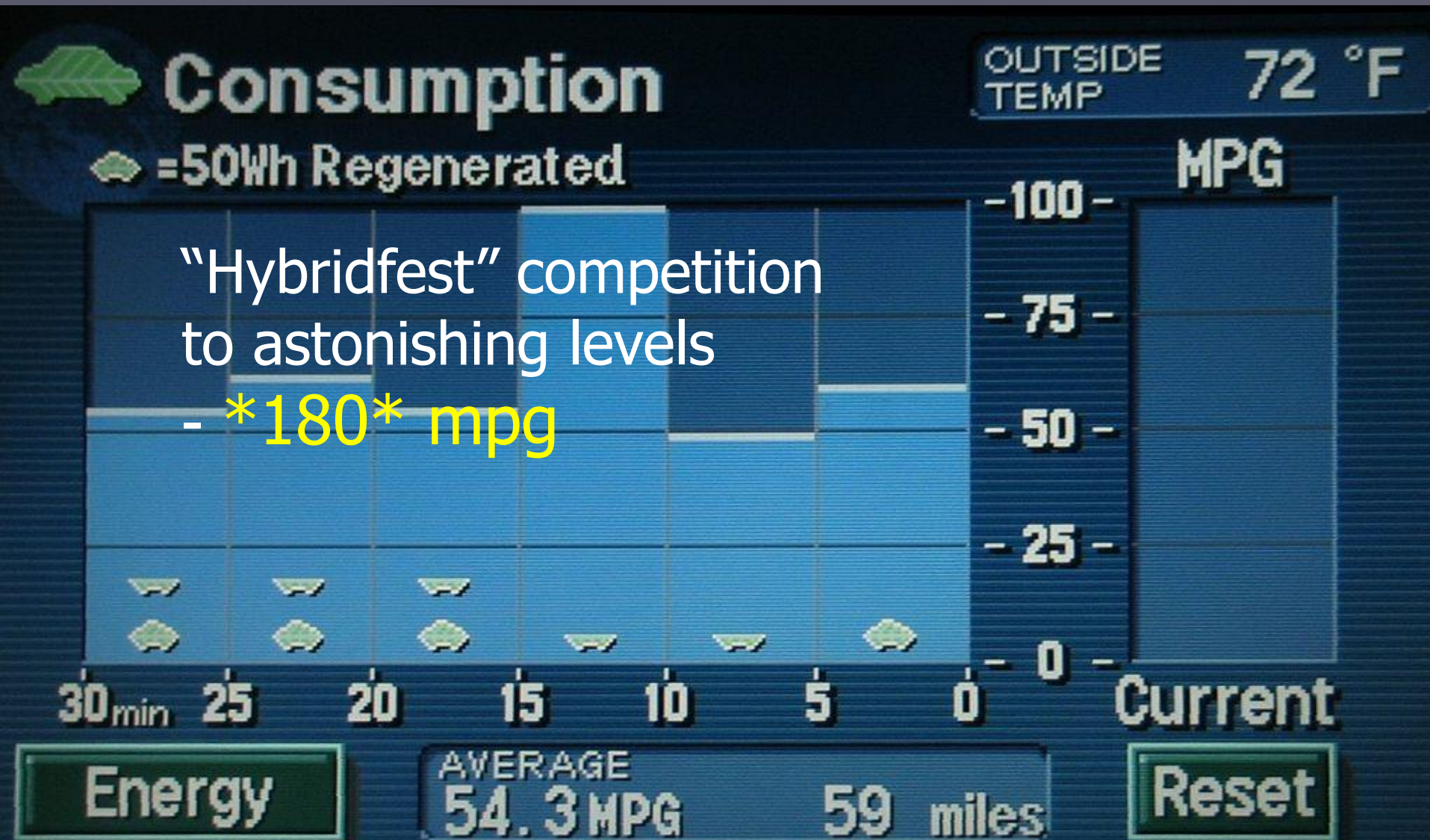
# Incentives & Sustainability

Financial incentives often work -  
but think outside the box

Vermont and  
time-of-use  
electricity pricing



# Learning Principles: Feedback



# Reinforcing Progress: Shaping

Meet people where they're at!

Ramp up slowly (and be prepared to backtrack)



Meatless Mondays?



# Behavior and Outcome: Variable Schedules of Reinforcement

Gambling

Stream clean-ups



Lotteries and  
contests!

# The Power of Variable Schedules





# Do I Have to Wait?

## “Delay Discounting” & Wiser Choices

- Establishing new habits
- Social support/new social norms
- Informal/formal commitments
- Greener alternative rewards
- Successful models to follow
- Recording progress on  
checklists, charts, & apps

# Large Scale Gamification

MIT  
Technology  
Review

---

Rewriting Life

## Pokemon Go Increased U.S. Activity Levels by 144 Billion Steps in Just 30 Days

This gaming craze increases activity levels for players, regardless of their age, sex, or weight.

by Emerging Technology from the arXiv    October 21, 2016

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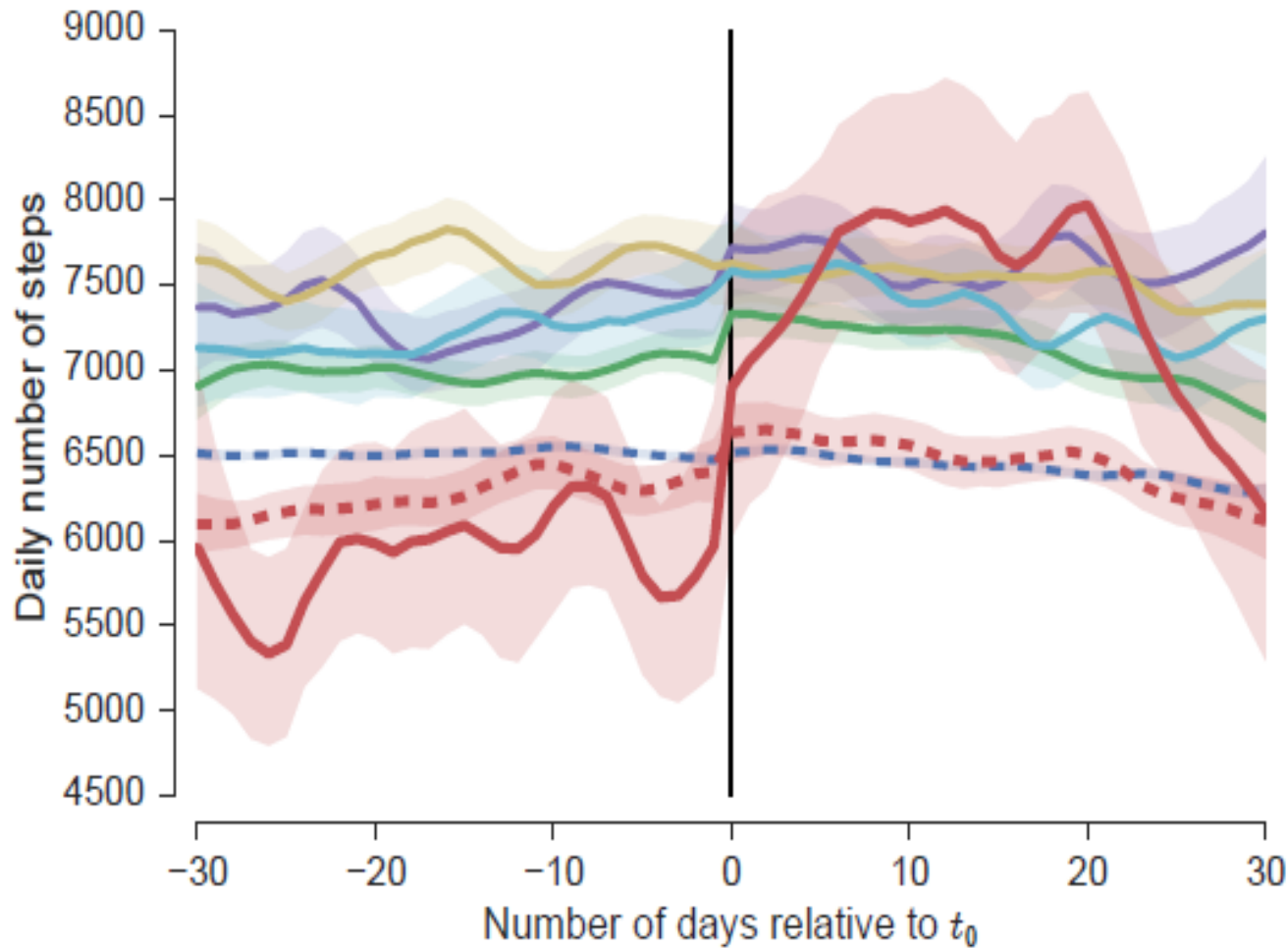


Althoff, White, & Horvitz (2016)

Over **25 million** players in US

Over 800 actives in the study/  
26,000 controls

# Large Scale Gamification



Activity up  
**hugely** –  
for a while

# The Power of Social Media: YouTube



#TEAMTREES

Help us plant 20 million trees  
around the globe by January 1st,  
2020.



**16,295,404**  
TREES PLANTED

JOIN TEAM TREES

\$1 PLANTS A TREE






...

20  
TREES

5  
TREES

50  
TREES

# Gamifying Sustainability: Energy Chickens!

Level -2	Level -1	Baseline 0	Level +1	Level +2
				

Orland, B., Ram, N., Lang, D., Houser, K. W., Kling, N., & Coccia, M. (2014). Saving energy in an office environment: A serious game intervention. *Energy and Buildings*, 74, 43-52.

# Energy Chickens at the Office – Success!

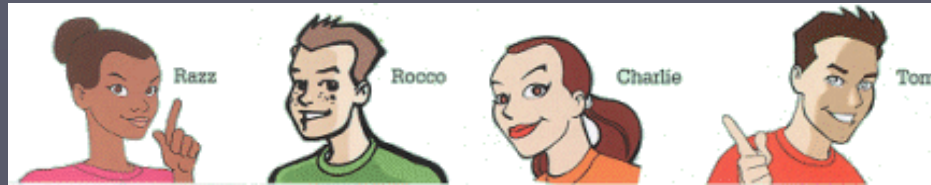
- Individual scoring, use collected eggs to build up farm

- 42 participants
- 288 devices,  
12 weeks

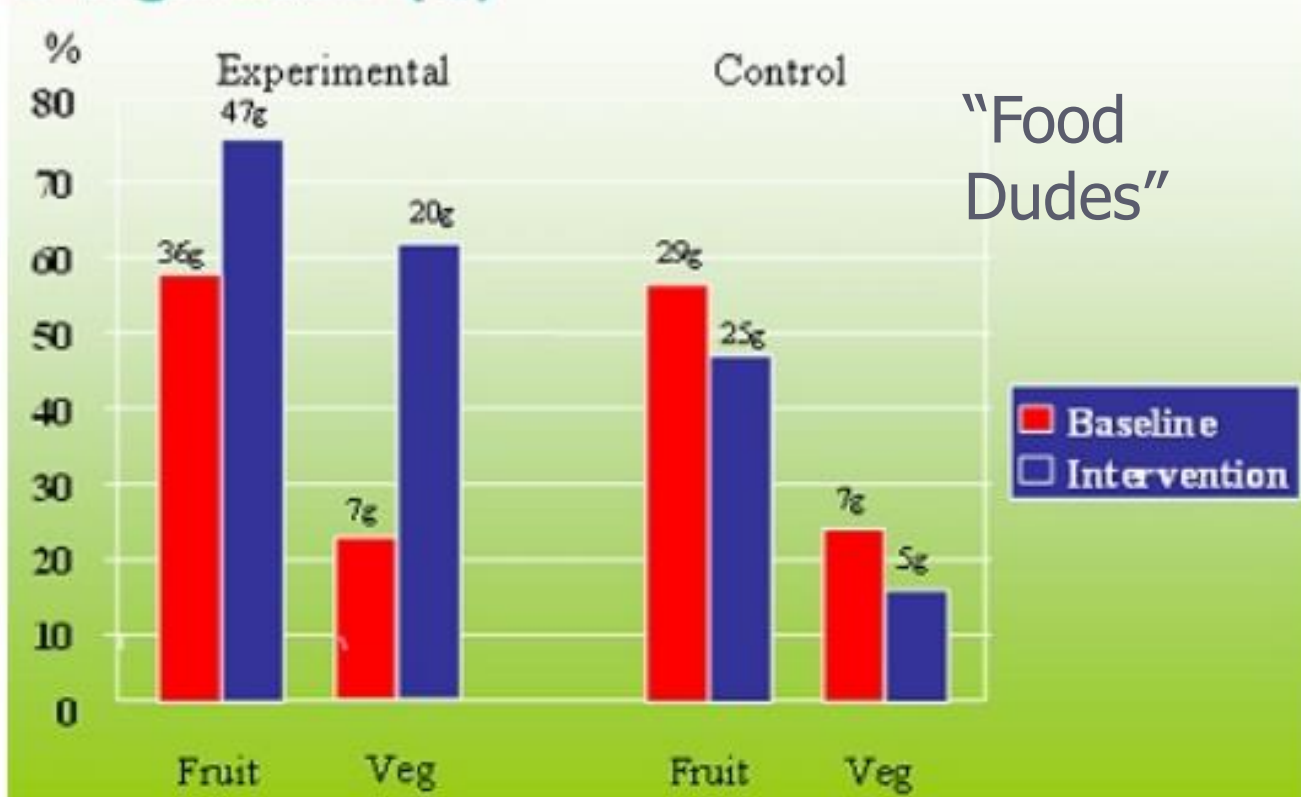


- 13% decline in energy use

# Food Dudes



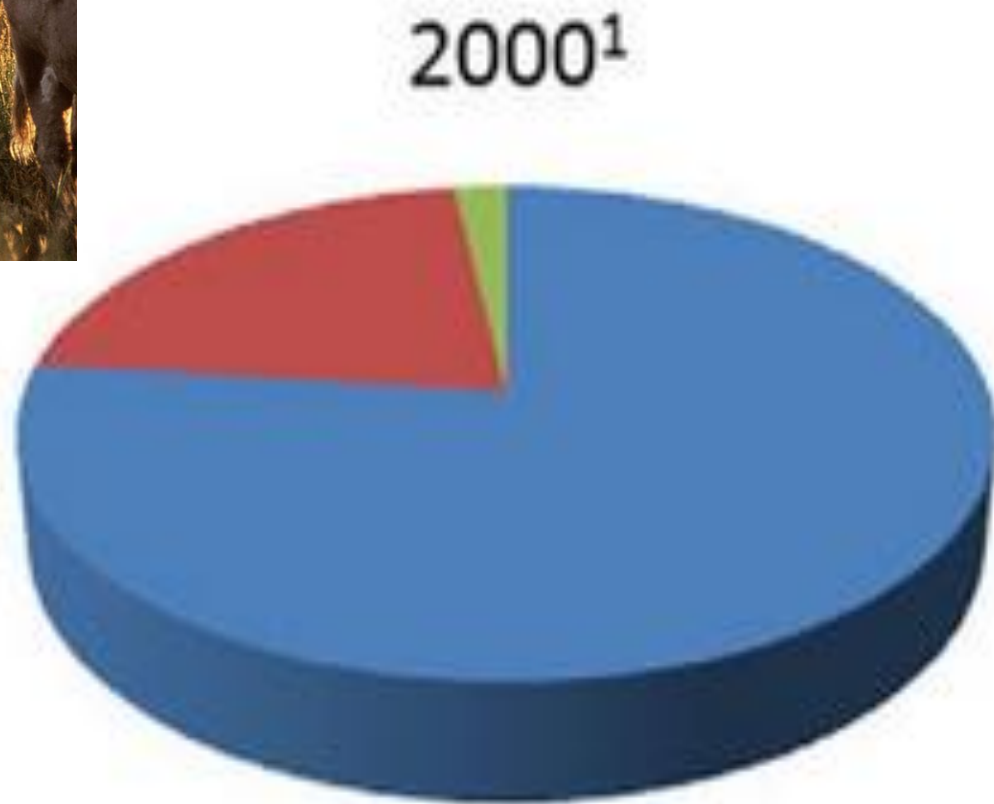
## Dublin - Consumption of school provided fruit & vegetables (%)



# Global Mammalian Biomass



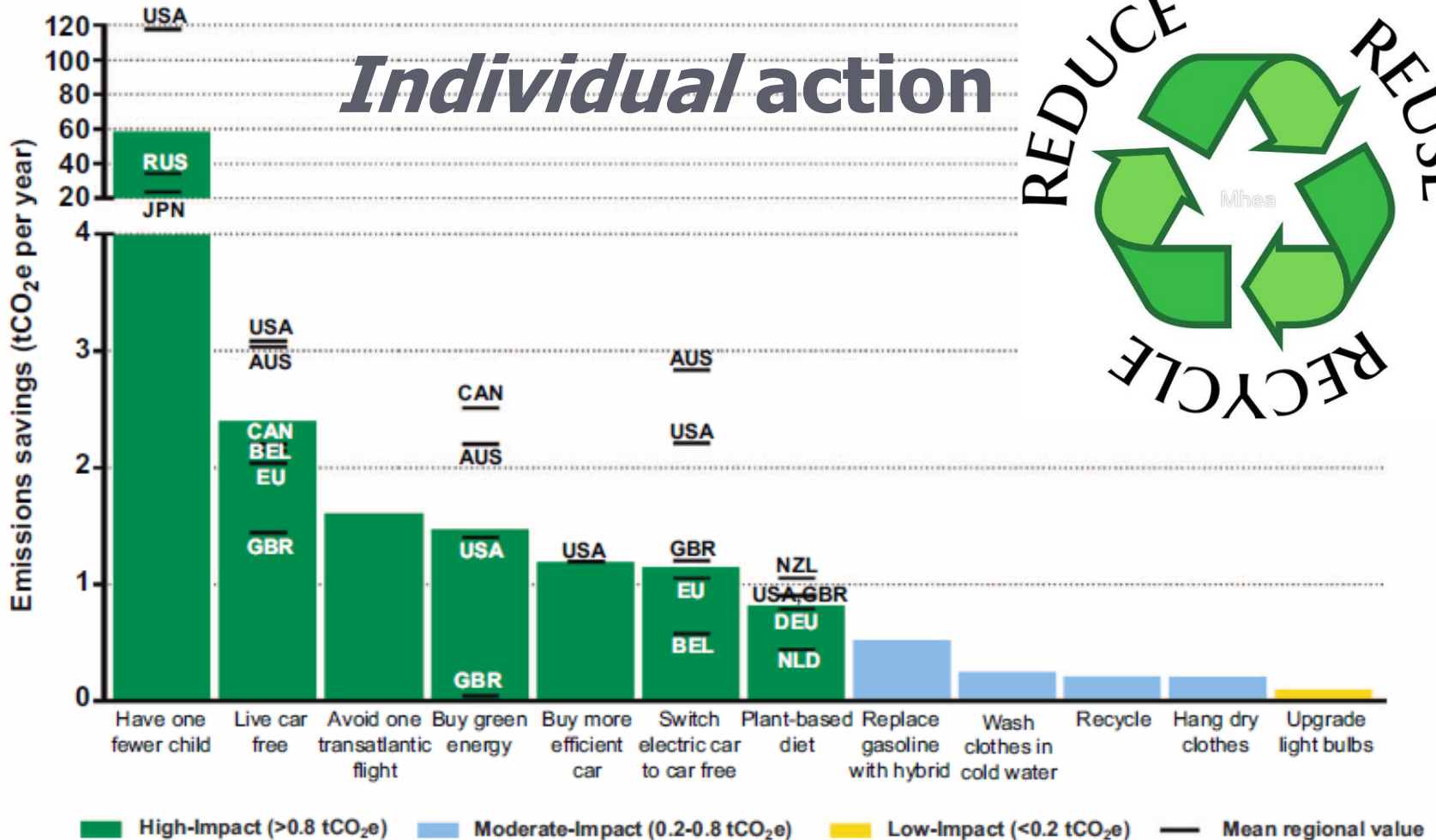
- Livestock
- Humans
- Wild



Zeller, U., Starik, N., & Gottert, T. (2017). Biodiversity, land use and ecosystem services—An organismic and comparative approach to different geographical regions. *Global Ecology and Conservation* 10:114-125.



# High Impact & Broad Impact



**Figure 1.** A comparison of the emissions reductions from various individual actions. The height of the bar represents the mean of all studies identified in developed nations, while black lines indicate mean values for selected countries or regions (identified by ISO codes) where data were available from specific studies. We have classified actions as high (green), moderate (blue), and low (yellow) impact in terms of greenhouse gas emissions reductions. Note the break in the y-axis. See supplementary materials 5 for details.

# Success: Seattle's "In Motion" Initiative

- Reduce solo car trips/Increase public transit, carpooling, biking
- Barriers identified
- Timing
- Start small (shaping)
- Pledges/free transit card
- Public meetings
- Individual tracking charts online, weekly reinforcing emails, reminders



# Seattle's "In Motion" Initiative

Typical **20% drop** in solo car trips

New habits formed



# Success: A Focus on the Group - & Feedback

Minnesota school district as an **Energy Star!**

Inclusive 13-year program

Teams

Rival school competition

Immediate reinforcement

Public recognition

>30% savings: over \$5,000,000



# Some Behavior Change Strategies

- Investigate barriers to change
- Use incentives – wisely
- Include attention/social support
- Provide comparative data on greenhouse gas emissions – feedback
- Find role models
- Offer people choices
- Create goals & **celebrate progress!**



# What Hope Looks Like



<https://350sacramento.org>

**ECOS Sacramento**

<https://www.ecosacramento.net>

**Other Resources: CoolCalifornia  
National Audubon's climate toolkit**