

Sustainable Nation, Climate Change Edition: Architects to the Rescue

Course Number TH511

Thursday June 21, 10:30am

Learning Units [As Published]

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Speakers List

Douglas Farr, FAIA, FCNU, NCI, LEED-AP

Learning Objectives

- Examine three trends closely related to the built environment—**sprawl, obesity, and climate change**—and how long it takes to counteract such trends.
- Understand how to apply proven accelerants in your practice and professional communities to **speed up the pace of change**.
- Learn about **70 urban design patterns of the future**, inspired by A Pattern Language, that provide guidance to the work ahead.
- Gain an appreciation for the slow pace of change in an apprentice profession and how **recent graduates may accelerate change by “training up.”**

Room Poll: Climate Change Leadership

Where will leadership come from to make buildings net-zero?

1. Federal policy
2. State and local codes
3. A/E community
4. Development and construction industry

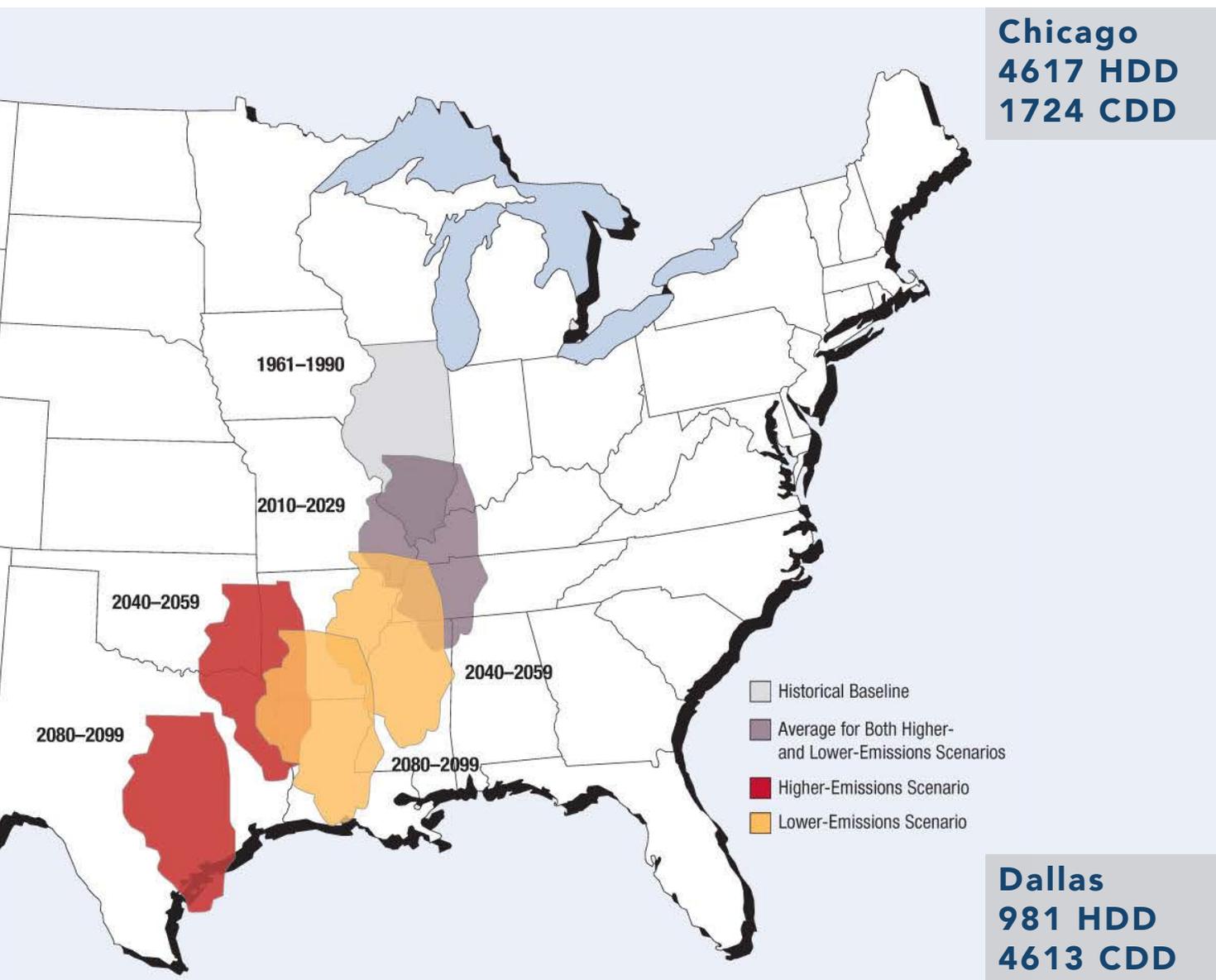
SUSTAINABLE NATION

URBAN DESIGN PATTERNS FOR THE FUTURE



DOUGLAS FARR

FOREWORD BY JANETTE SADIK-KHAN



Chicago
4617 HDD
1724 CDD

Dallas
981 HDD
4613 CDD

Consequences of twenty-first-century policy for multi-millennial climate and sea-level change

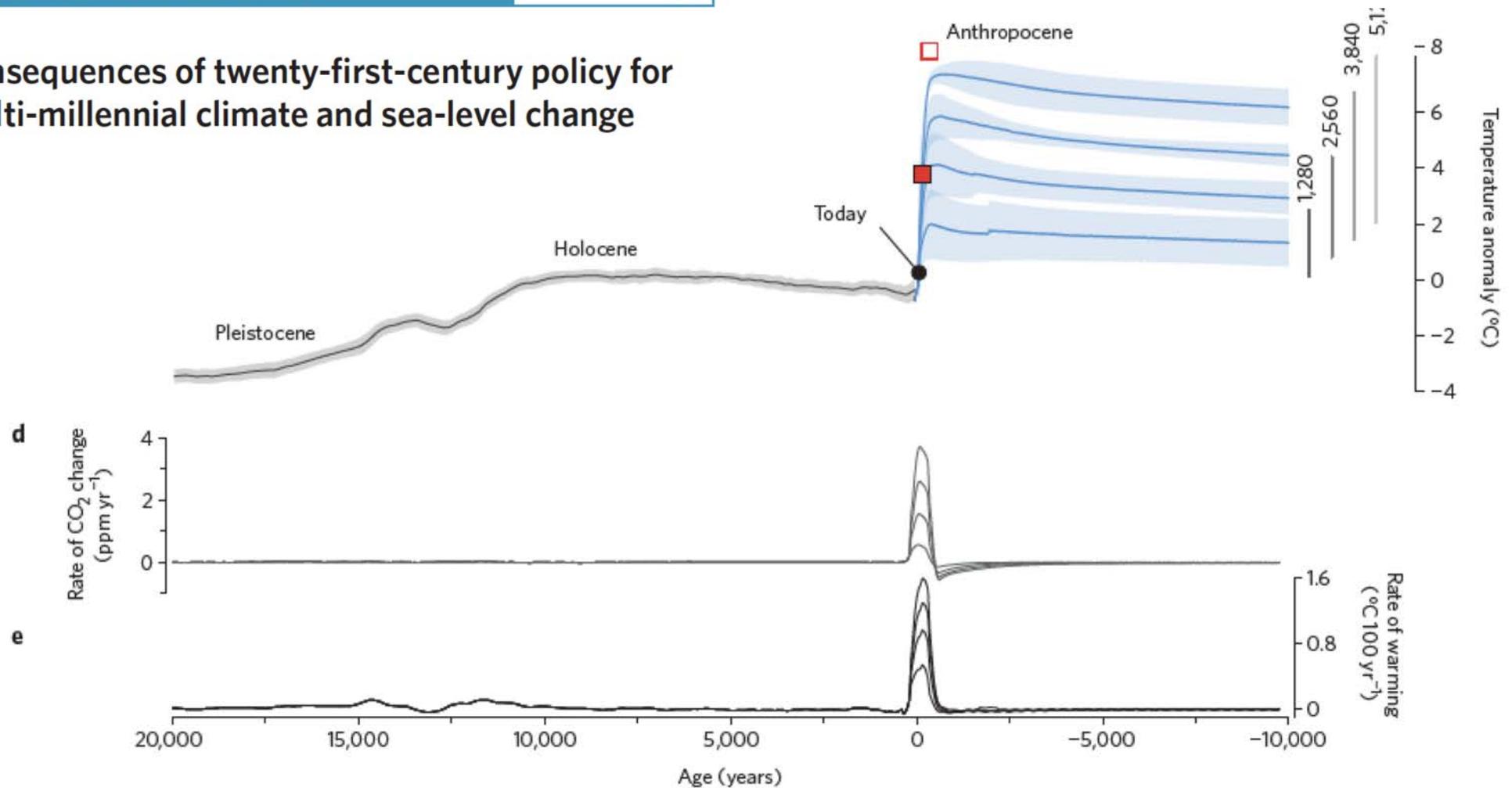
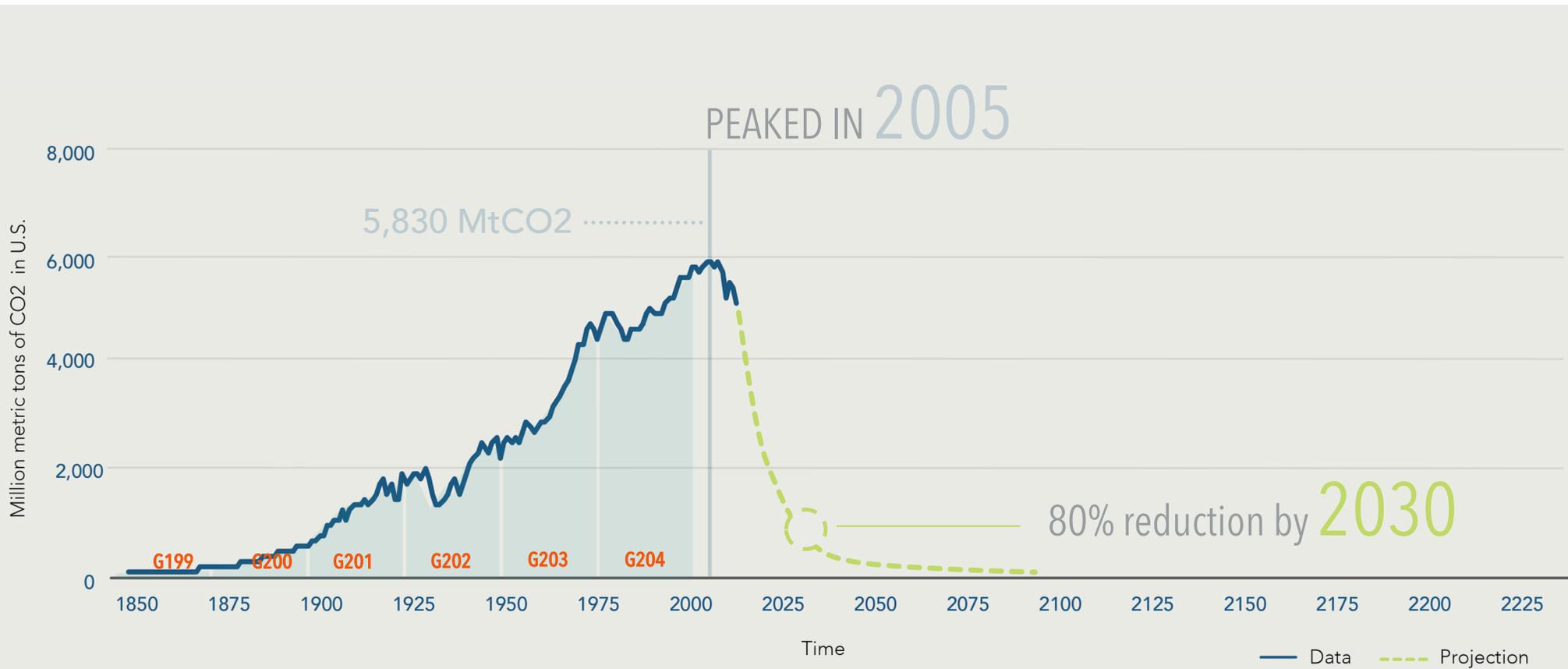


Figure 1 | Past and future changes in concentration of atmospheric carbon dioxide and global mean temperature. **a**, Maps showing model-simulated

U.S. CO₂ Projection (Ed Mazria, 2030 Challenge)



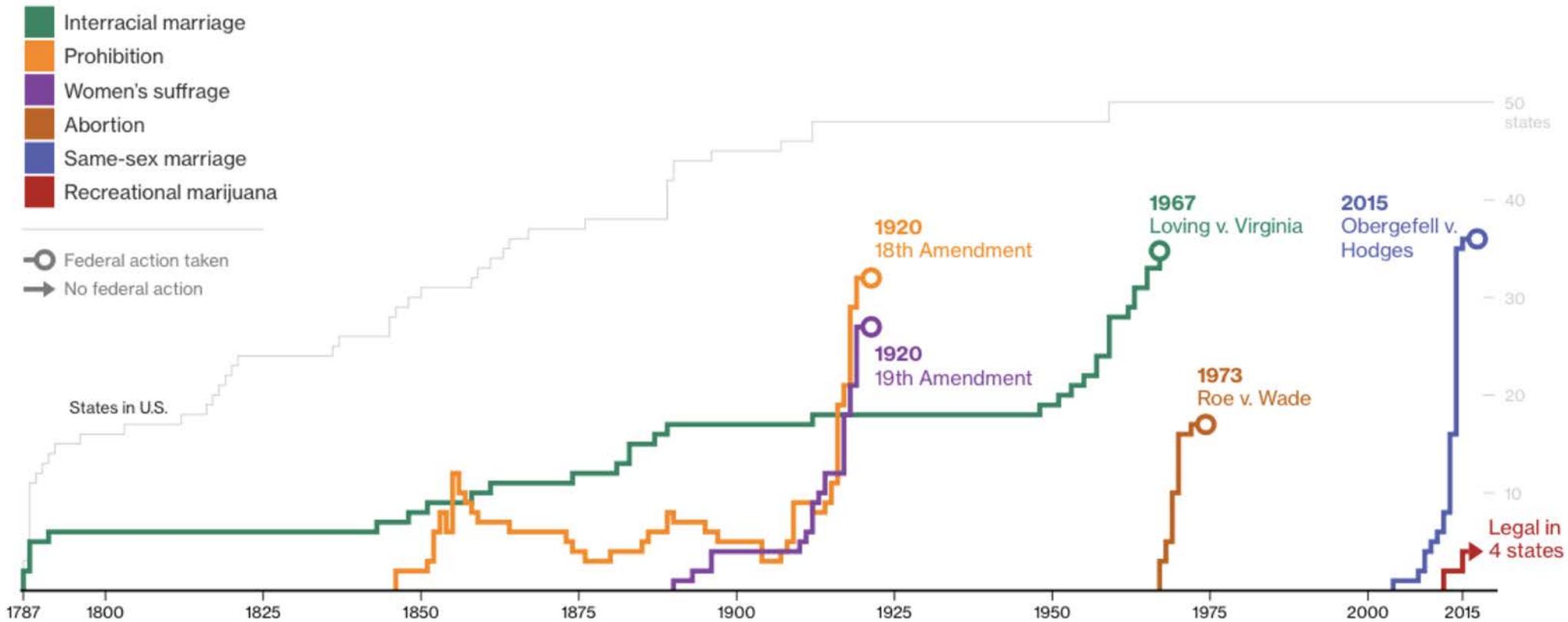
Source: CAIT Climate Data Explorer



HOW LONG DOES CHANGE TAKE?

Tracking the Pace of Social Change

Number of states that have removed a ban, by year
(Prohibition shows the number of states that enacted)

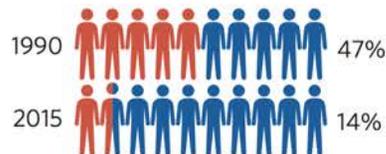


Millennium Development Goals

In one generation, extreme poverty and hunger went down by 2/3 and child mortality by 1/2



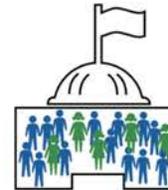
Extreme poverty rate in developing countries



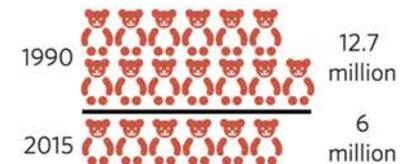
Global out-of-school children of primary school age



90% of countries have more women in parliament since 1995



Global number of deaths of children under five

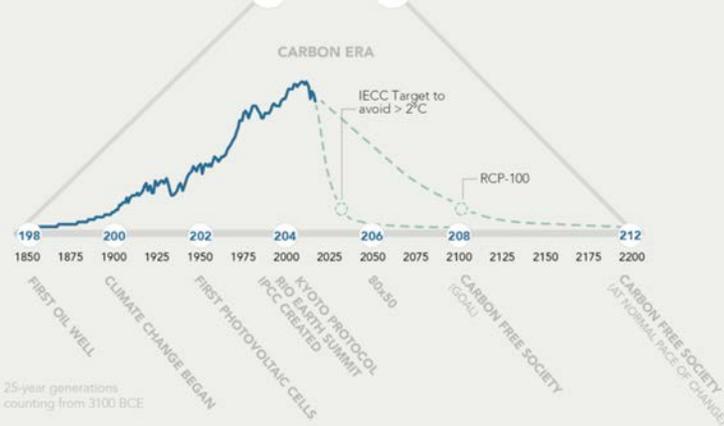


SOURCE: The U.N. Millennium Goals Report (2015)

GLOBAL PROGRESS

A HISTORY OF CIVILIZATION

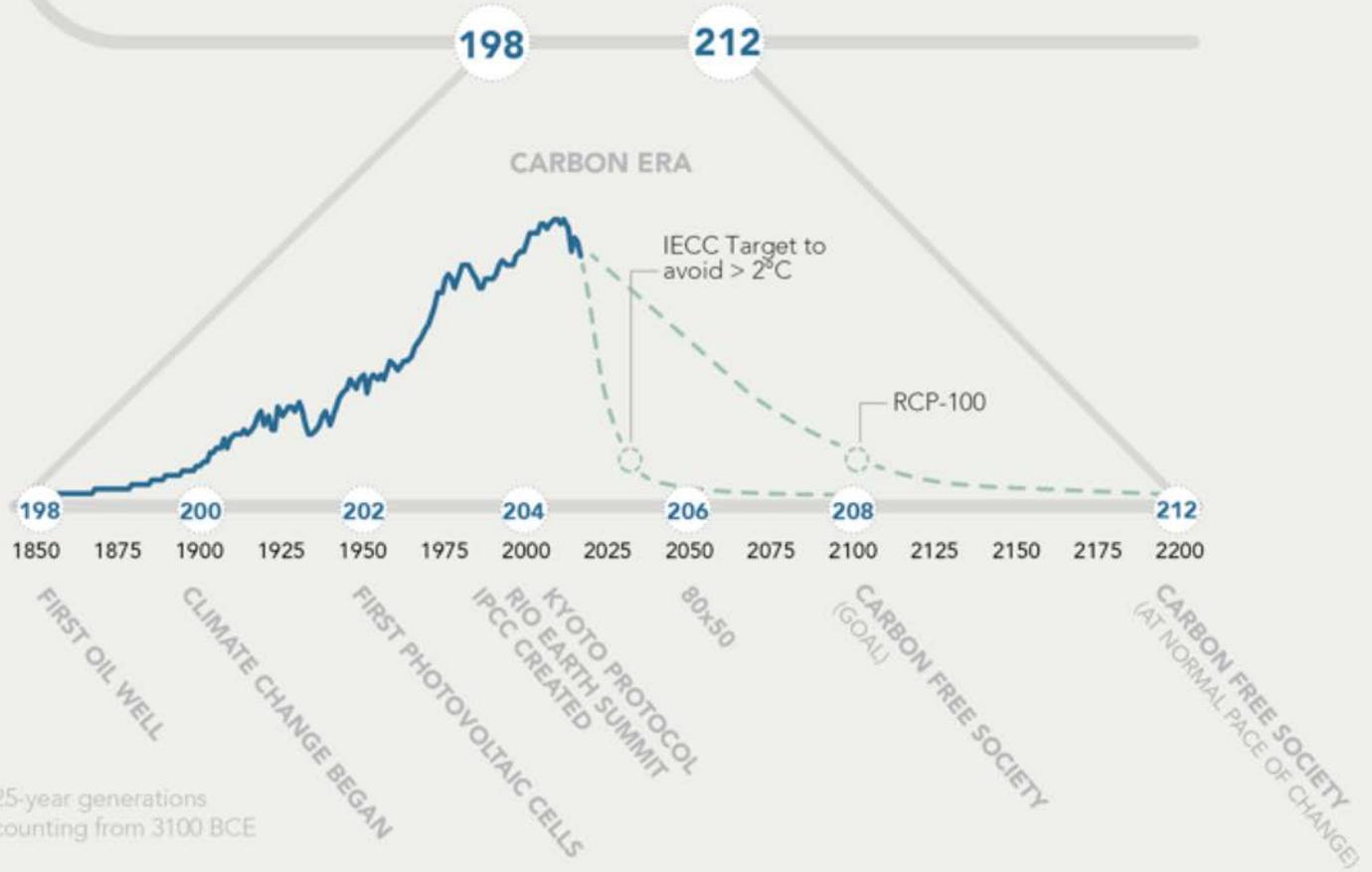
(in 25-year generations)



XX 25-year generations counting from 3100 BCE



INDUSTRIAL REVOLUTION
1850





Reversing 3 Health, Safety and Welfare Trends



SPRAWL



OBESITY

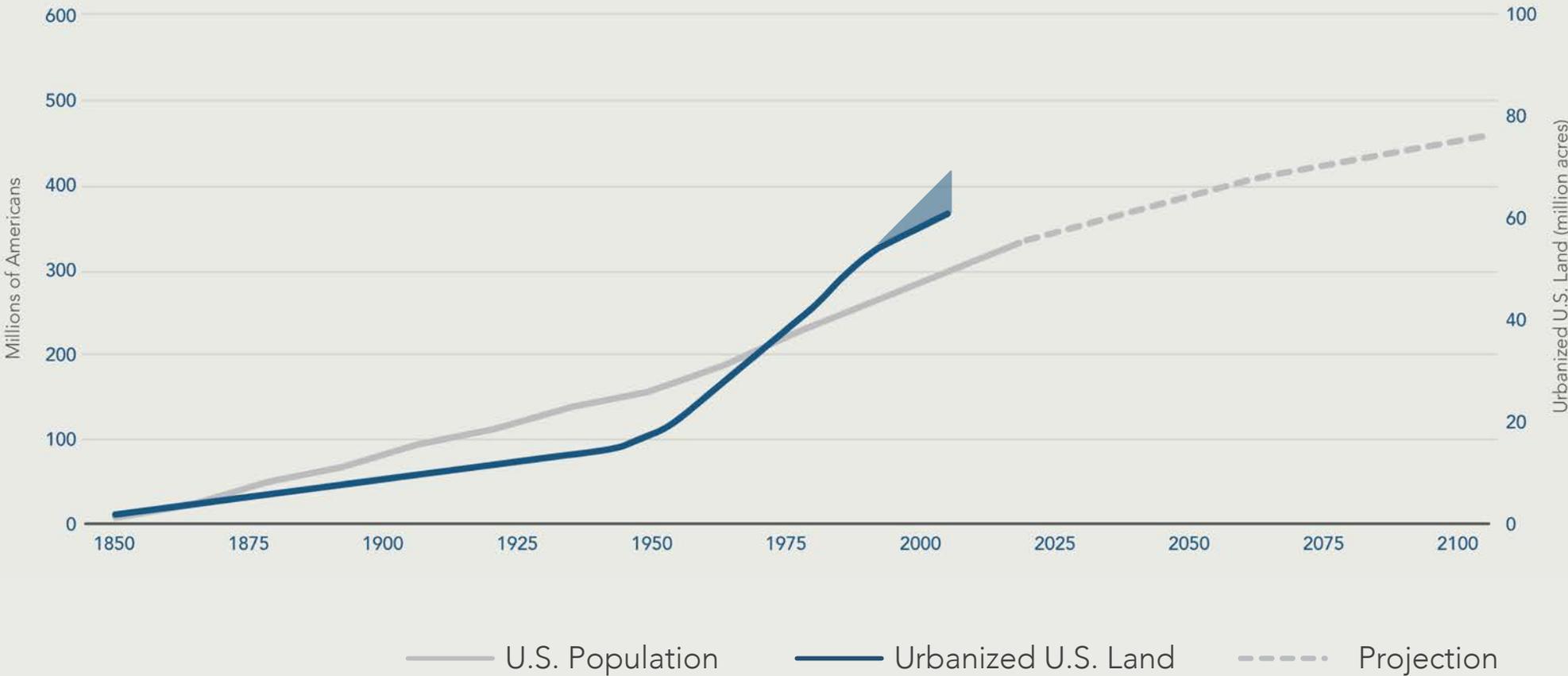


CO2



Sprawl

The U.S. sprawled for 2 generations, then slowed slightly



86% of U.S. neighborhoods are automobile dependent

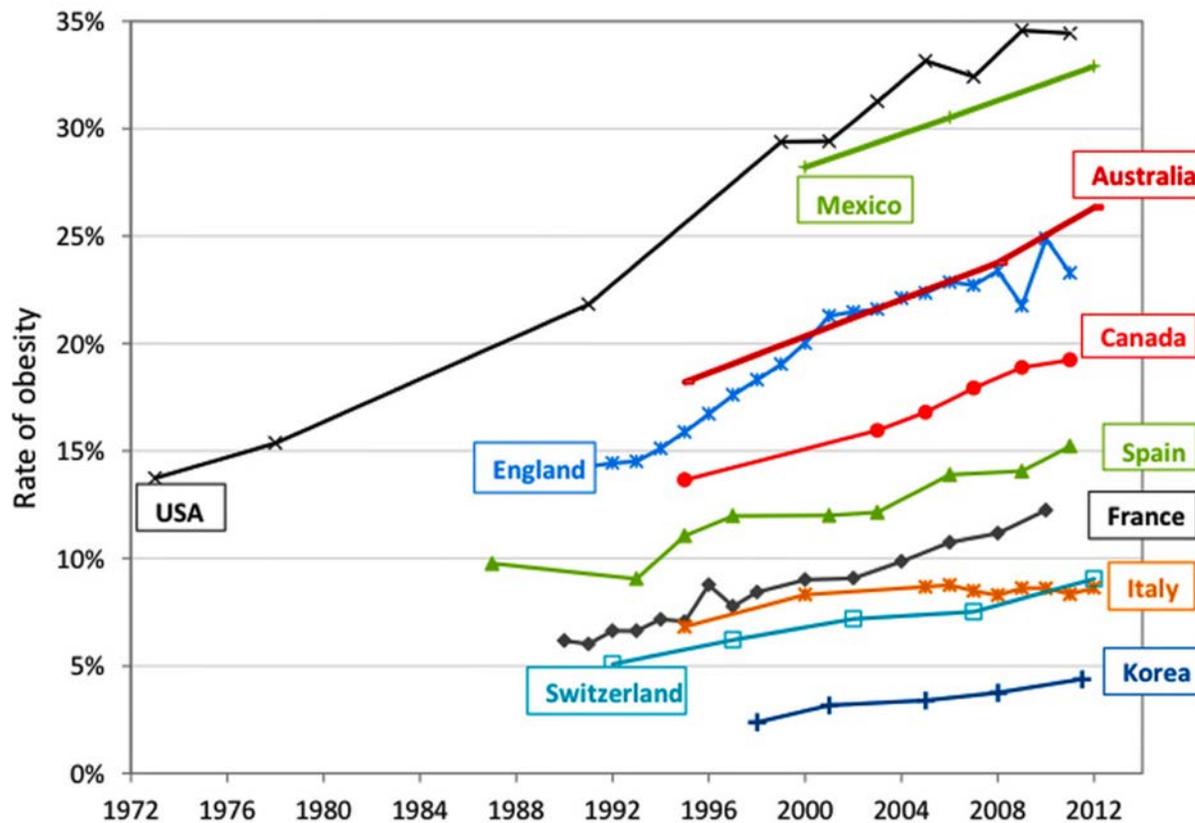




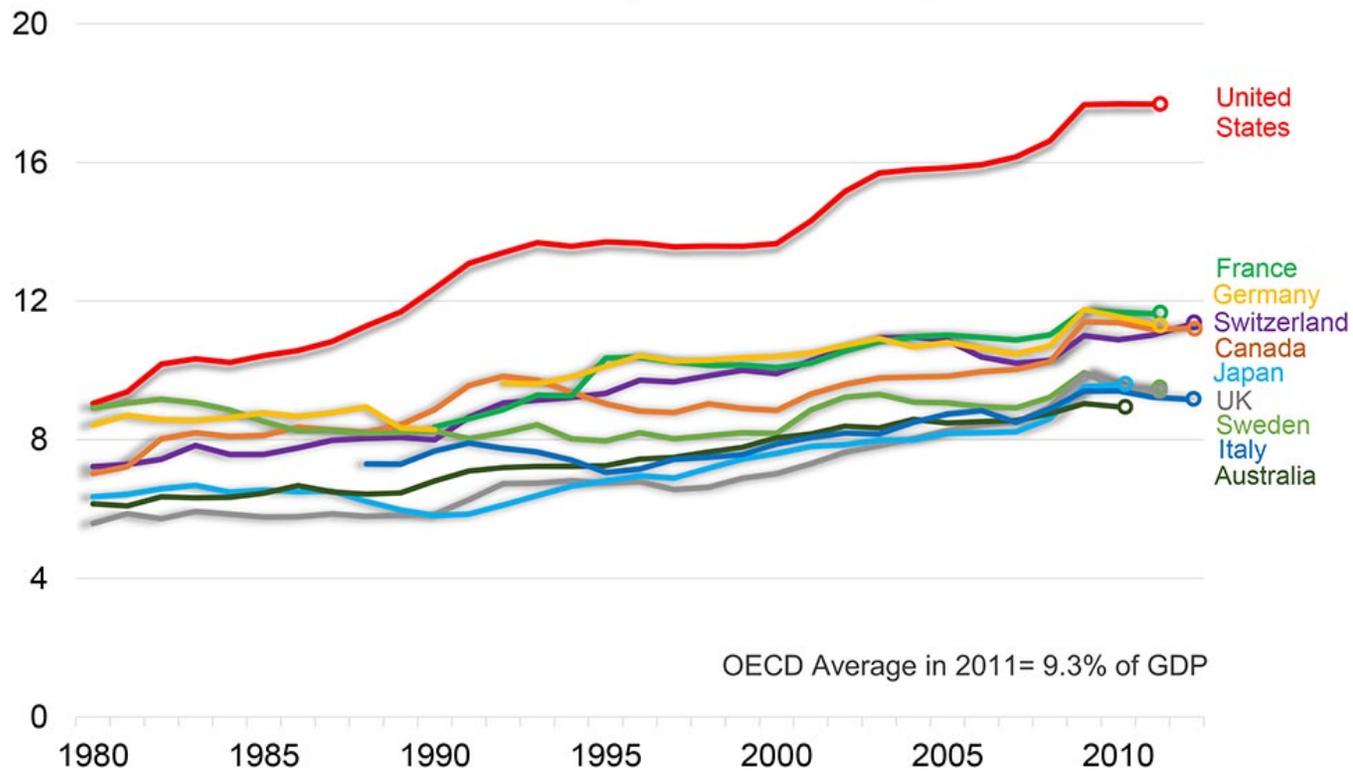
Obesity



Obesity is a Global Epidemic, Yet to Peak Anywhere



The U.S. Spends 8% GDP more on health care (21% of annual healthcare expenditures are related to obesity)

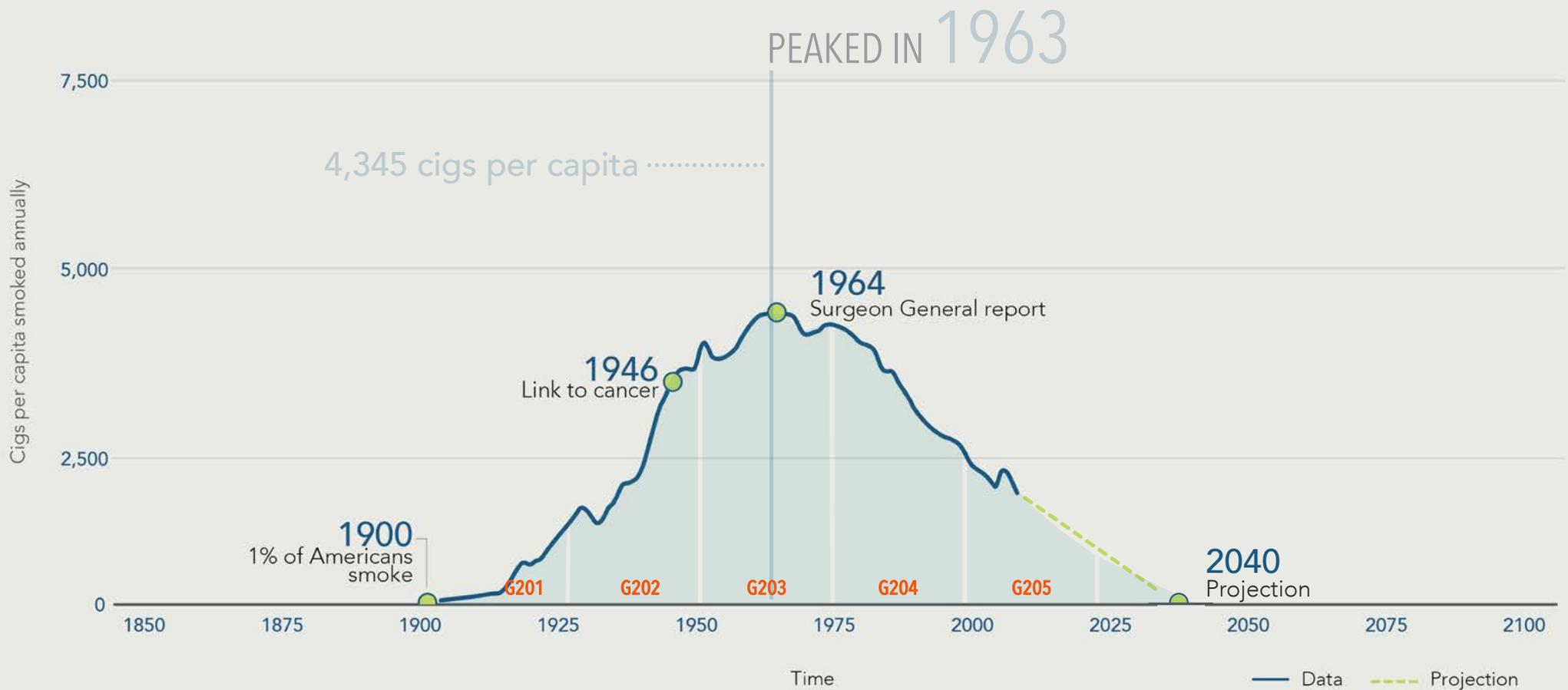


Source: OECD Health Data 2013.
Produced by Veronique de Rugy, Mercatus Center at George Mason University.
Source: Journal of Health Economics



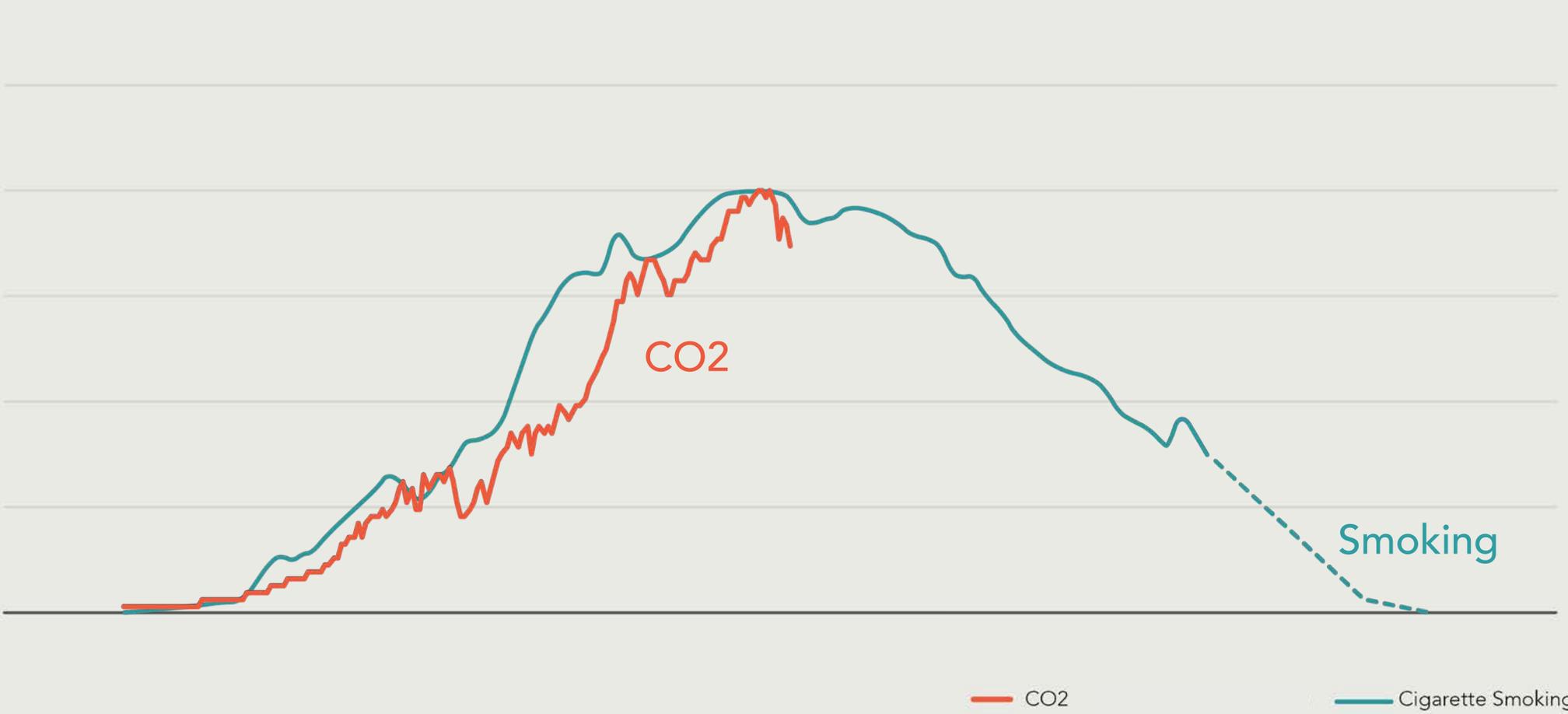
CO₂

U.S. Cigarette Smoking

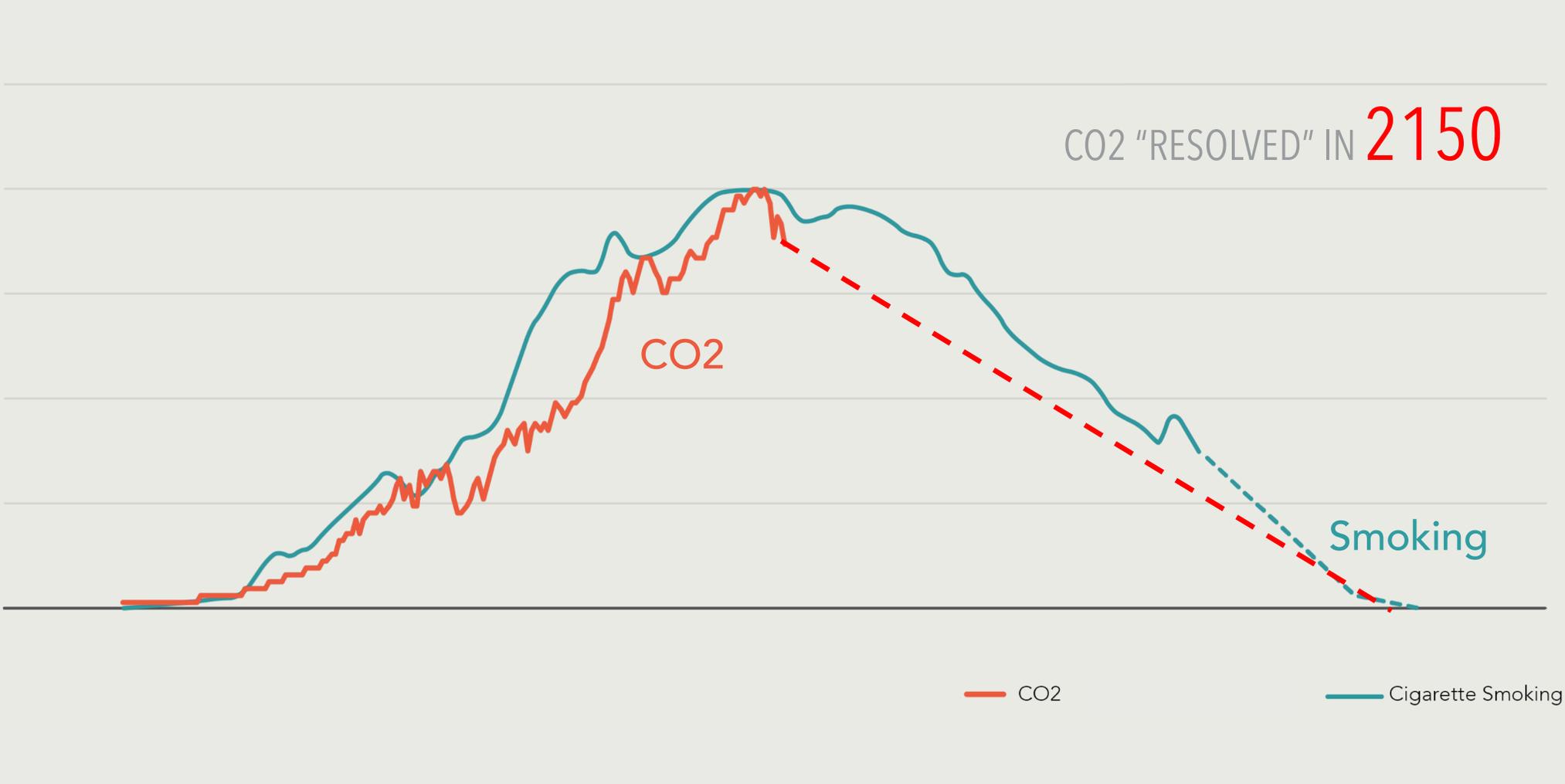


Source: lung.org

How fast would we decarbonize if we reversed course at the pace of smoking?



How fast would we decarbonize if we reversed course at the pace of smoking?



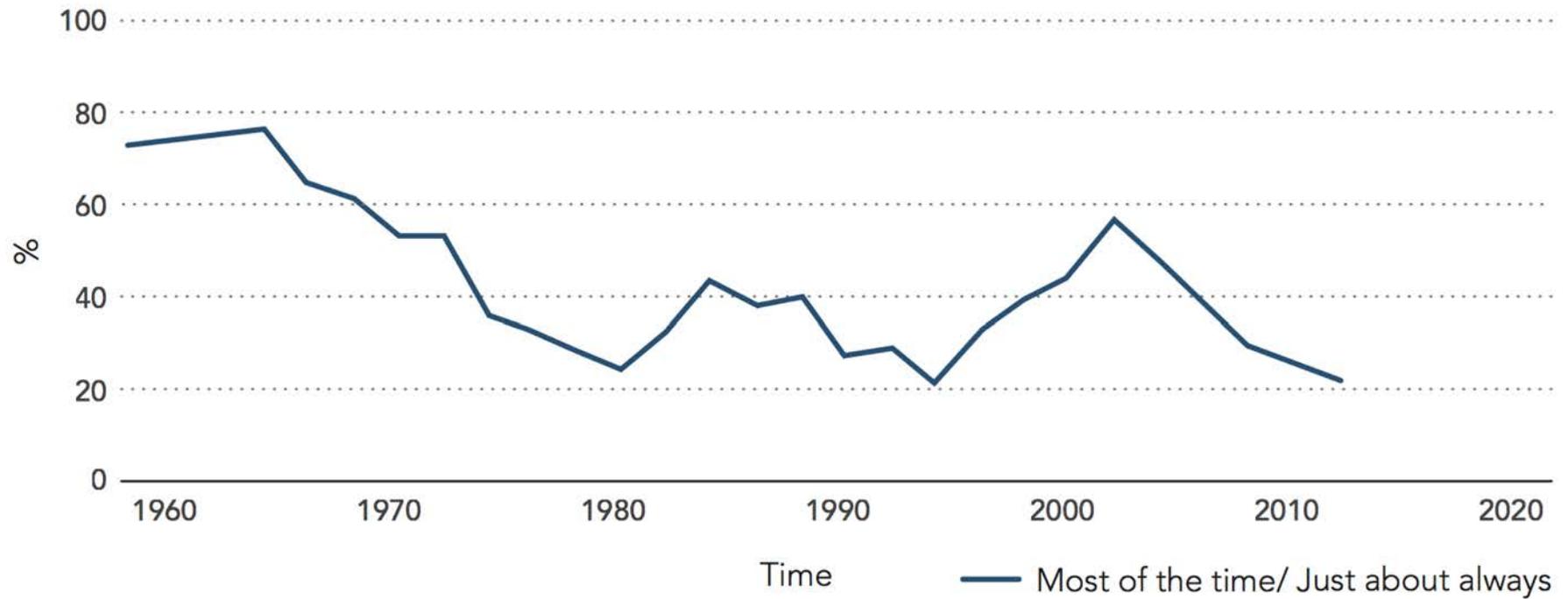


Are we totally **screwed**?

How can we change
faster than we ever have?

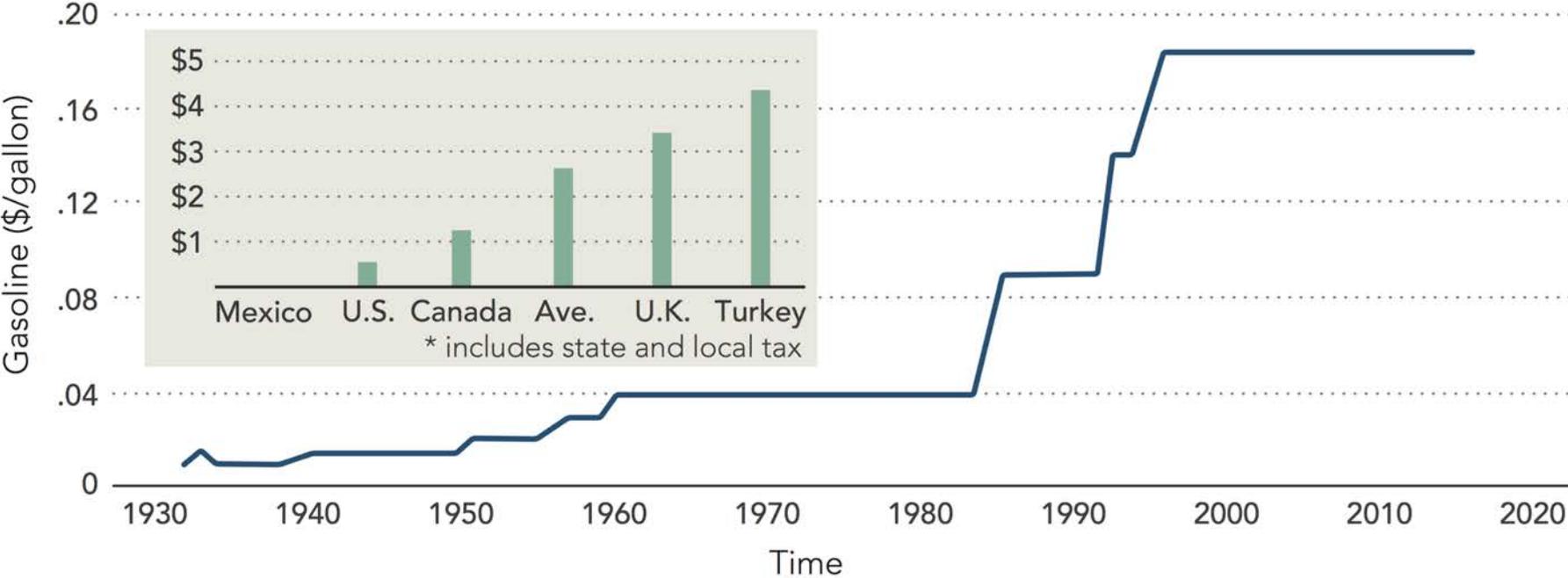
Public Trust in Government

This trend began with Vietnam and Watergate and has since been amplified by a campaign.



Federal Gas Tax

Supporting a gas tax is seen as political suicide.

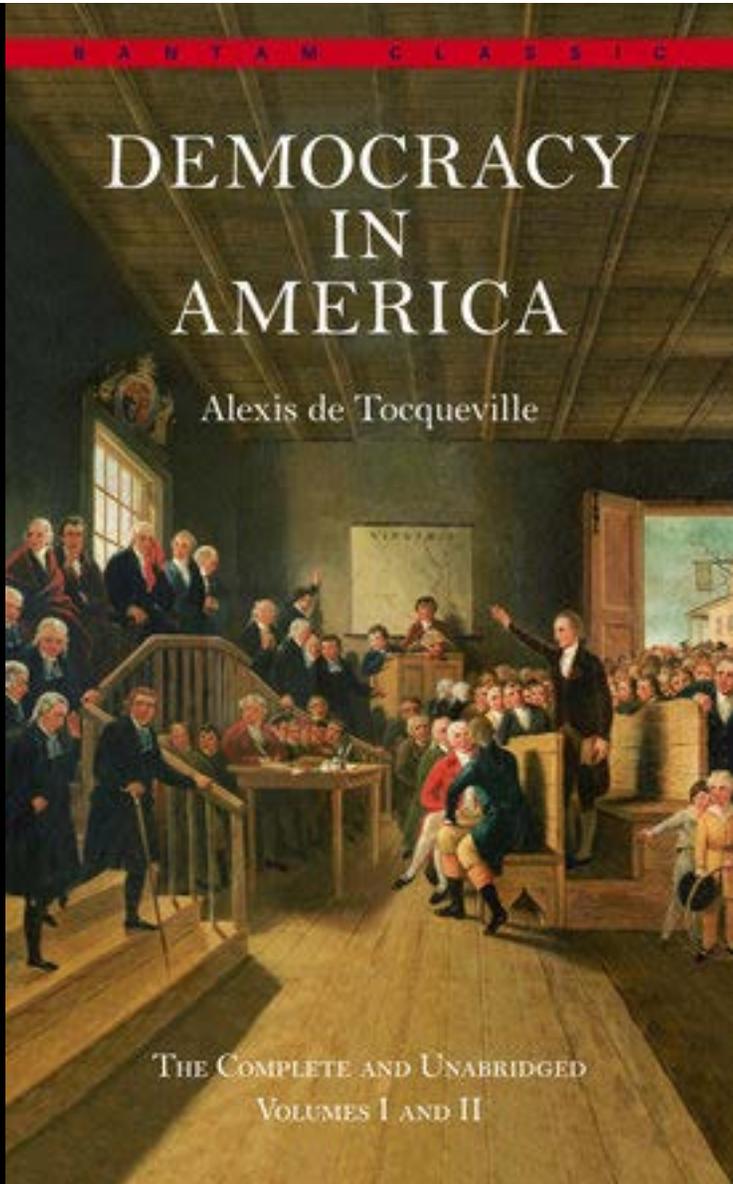


— U.S. federal gas tax

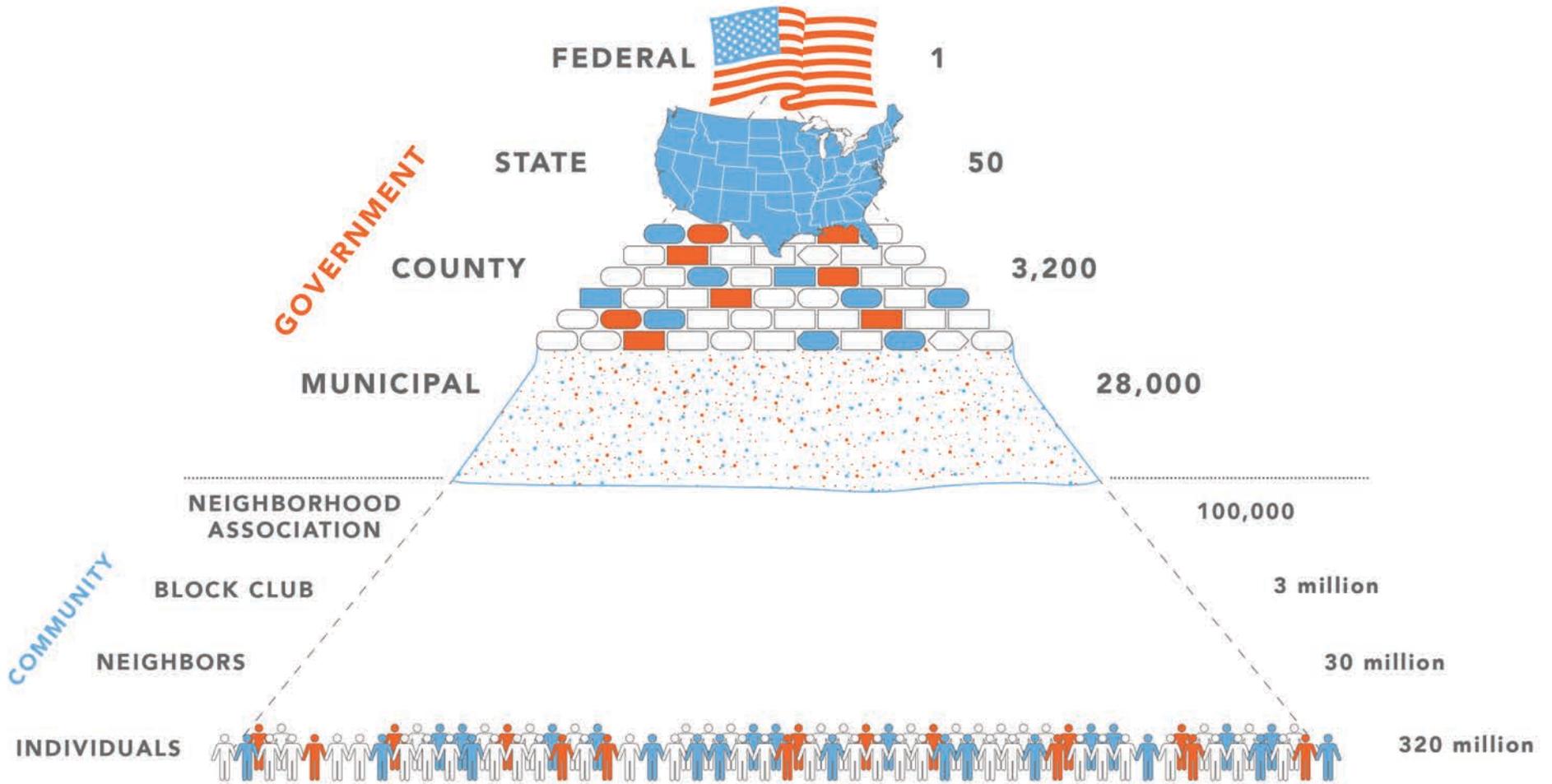
NATIONAL BARRIERS

THEORY OF CHANGE

THE PROCESS OF DEFINING LONG-TERM GOALS AND MAPPING BACKWARD TO IDENTIFY THE STEPS NEEDED TO ACHIEVE THEM.



The Untapped Power of Private Groups



The Power of Face-to-Face Contact to Drive Change

	Hedges g	95% CI
Block leader	.82	[.49, 1.16]
Public commitment	.60	[.18, 0.85]
Modelling	.51	[.10, 0.71]
Group feedback	.29	[-.07, 0.66]
Social comparison	.13	[-.30, 0.57]
Social norms	.10	[.04, 0.20]

small effect : < .30
medium effect : .30 - .80
large effect : > .80

America's Fears

A fear of others permeates our lives.



NATIONAL THREATS

ACCELERANTS

+

PATTERNS

= FAST CHANGE





PATTERNS

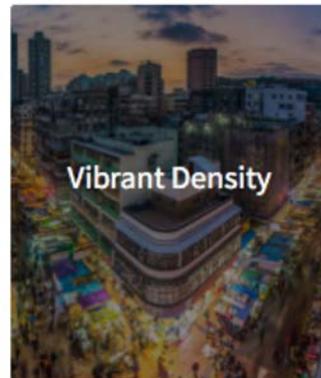
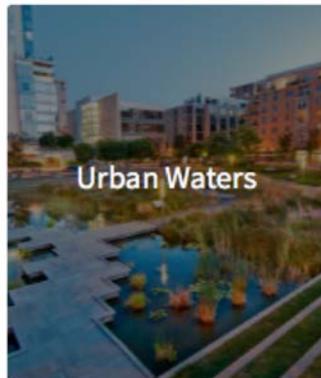
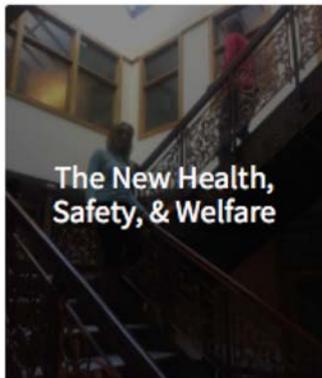
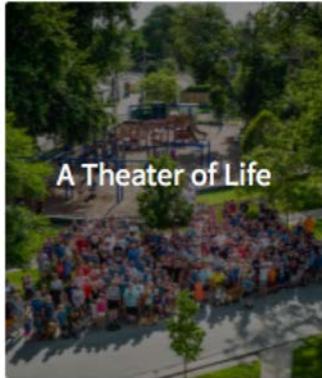


A Pattern Language

Towns · Buildings · Construction



Christopher Alexander
Sara Ishikawa · Murray Silverstein
WITH
Max Jacobson · Ingrid Fiksdahl-King
Shlomo Angel





Acceleration Strategies

ACCELERANTS





COMMUNITY OF PRACTICE

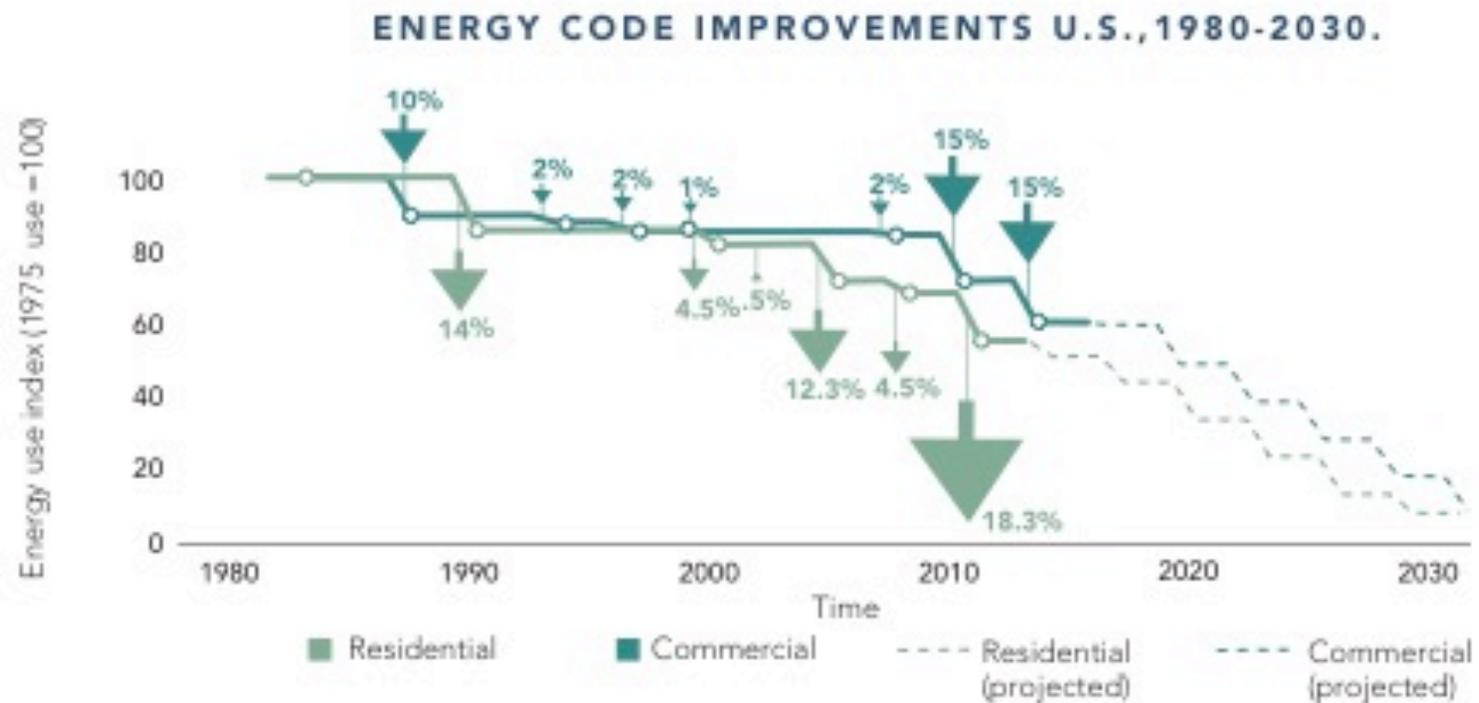
Energy Efficiency in Buildings

COMMUNITIES OF PRACTICE

GROUPS OF PEOPLE WHO SHARE A CONCERN OR A PASSION FOR SOMETHING THEY DO, LEARN HOW TO DO IT BETTER AS THEY INTERACT, AND CARE ABOUT THEIR SOCIAL STANDING WITHIN THE GROUP.

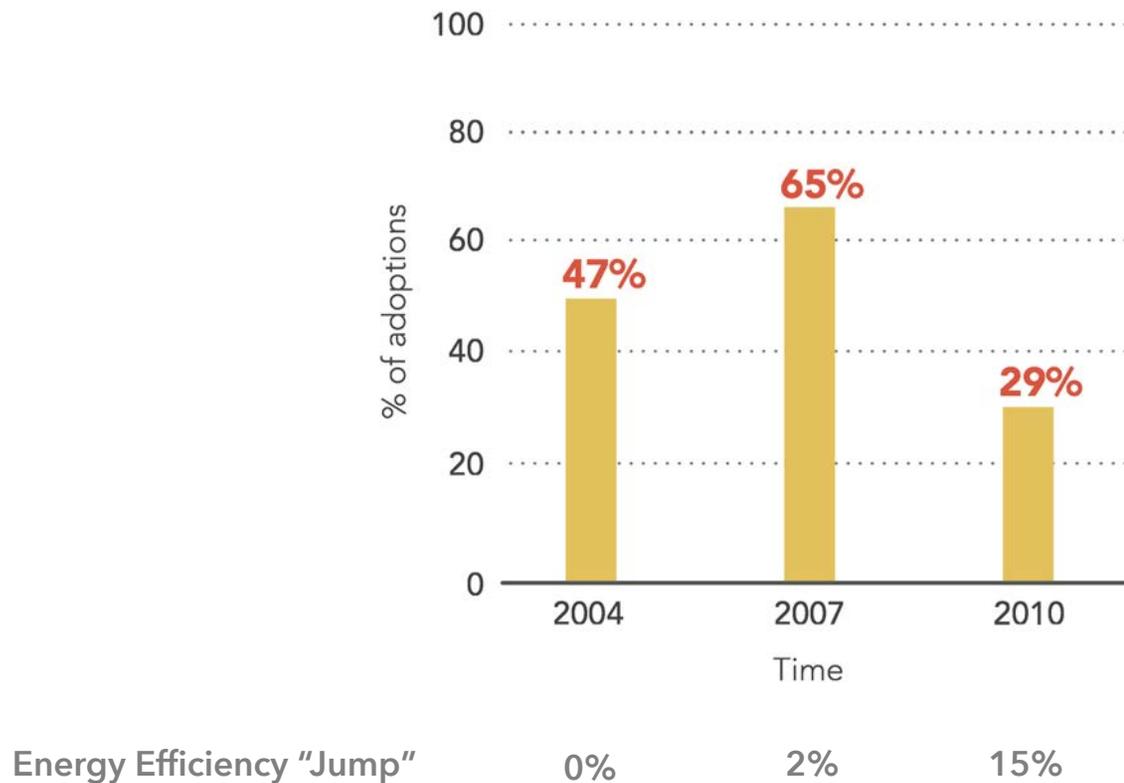
Proposed IECC Energy Efficiency Improvements

Shortening the shelf life of a typical LEED building to 6 years.



Adoption of IECC Commercial After 5 Years by U.S. States & Territories

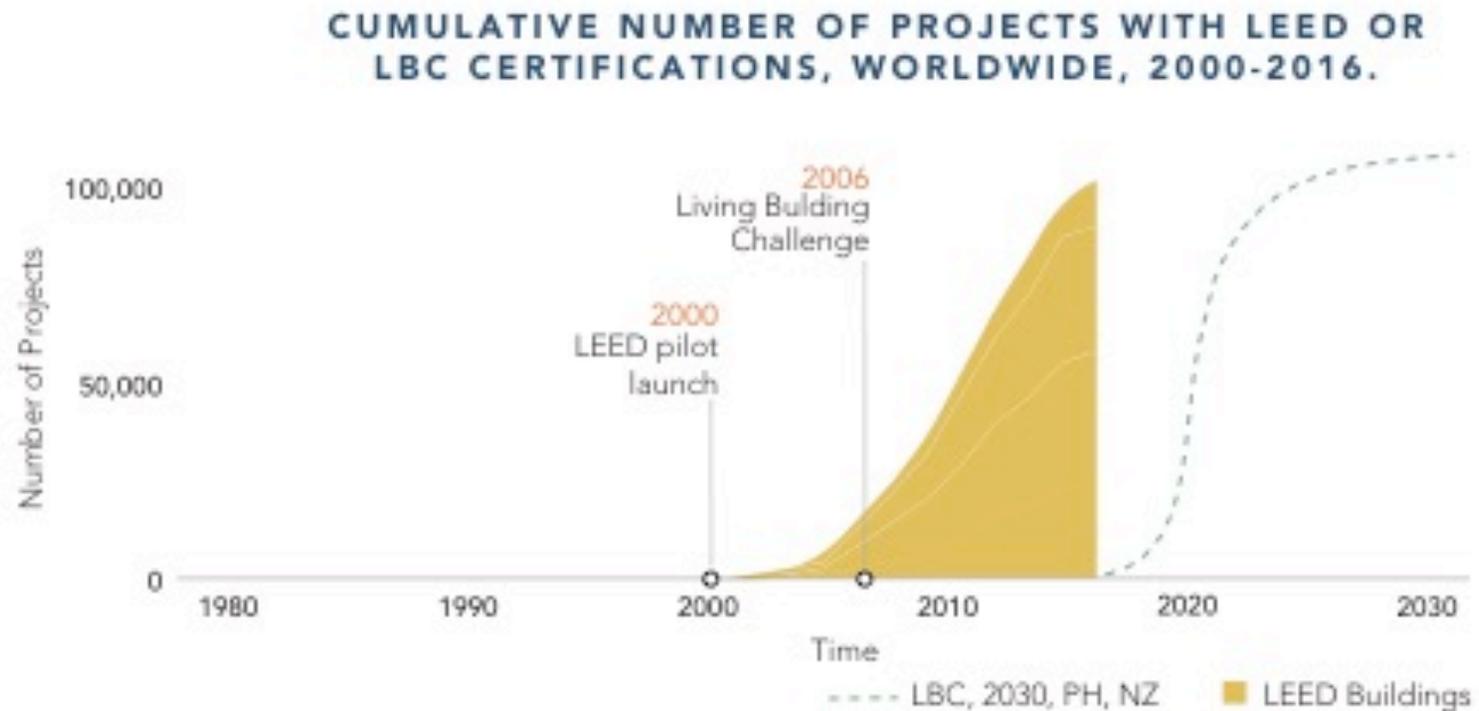
Adoptions appear to be slower in bad economies and with more aggressive steps



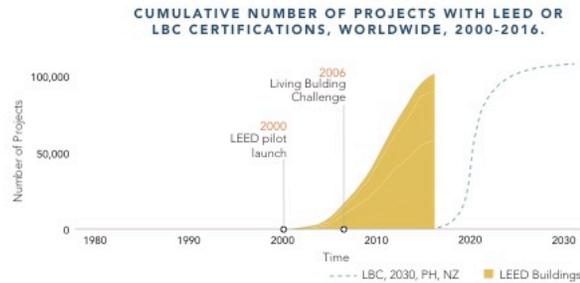
TIME

Green Buildings that Voluntarily Exceed the IECC

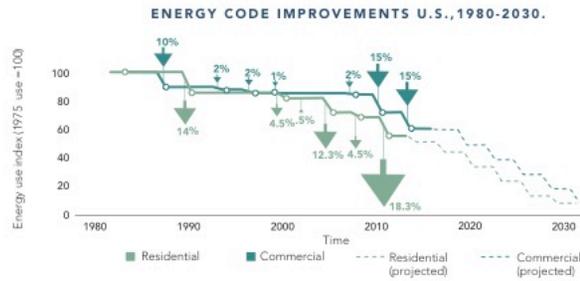
A typical LEED building exceeds code by 25-30%



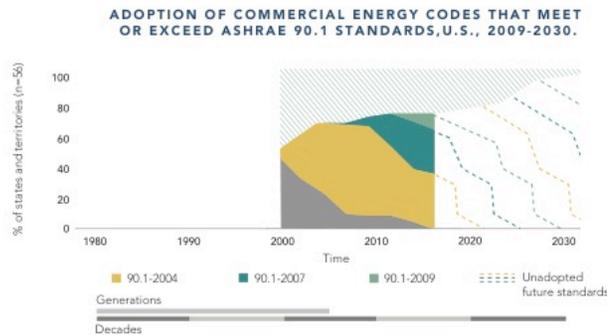
Community of Practice, EE Buildings: 1980 to 2030



Architects build buildings that exceed code ...



That prove the feasibility of projected code upgrades ...



And more aggressive codes will be adopted more slowly

An aerial photograph of a modern building with a glass roof and colorful sculptures on top. The building has a brick base and a glass upper section. The roof is covered in solar panels. Several colorful sculptures, resembling stylized figures or objects, are mounted on the roof. The text "PILGRIMAGE SITES" is overlaid in white on a blue semi-transparent banner across the middle of the image.

PILGRIMAGE SITES

PILGRIMAGE SITES

SPECIAL PLACES OR BUILDINGS THAT
DEMONSTRATE THE VIABILITY OF A
PREFERRED FUTURE.



BULLITT CENTER

Seattle, Washington



HAMMARBY SJÖSTAD

Stockholm, Sweden



ETHICS AND LIABILITY

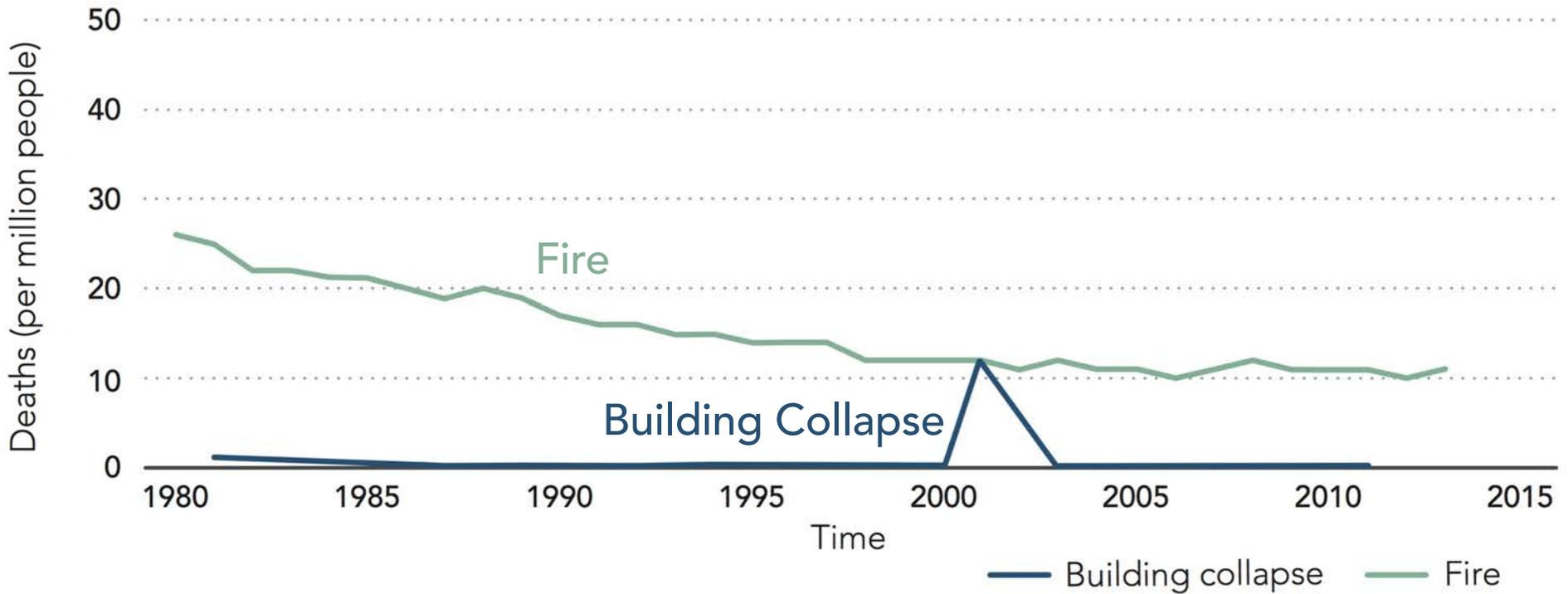
The New Health Safety and Welfare

PROFESSIONAL ETHICS AND LIABILITY

CHANGES IN PROFESSIONAL PRACTICE
RESULTING FROM THE PERCEIVED THREAT
OF LIABILITY, ASSOCIATED WITH NEW AND
EMERGING PROFESSIONAL STANDARDS OF
HEALTH, SAFETY AND WELFARE.

THE CURRENT HEALTH, SAFETY, AND WELFARE

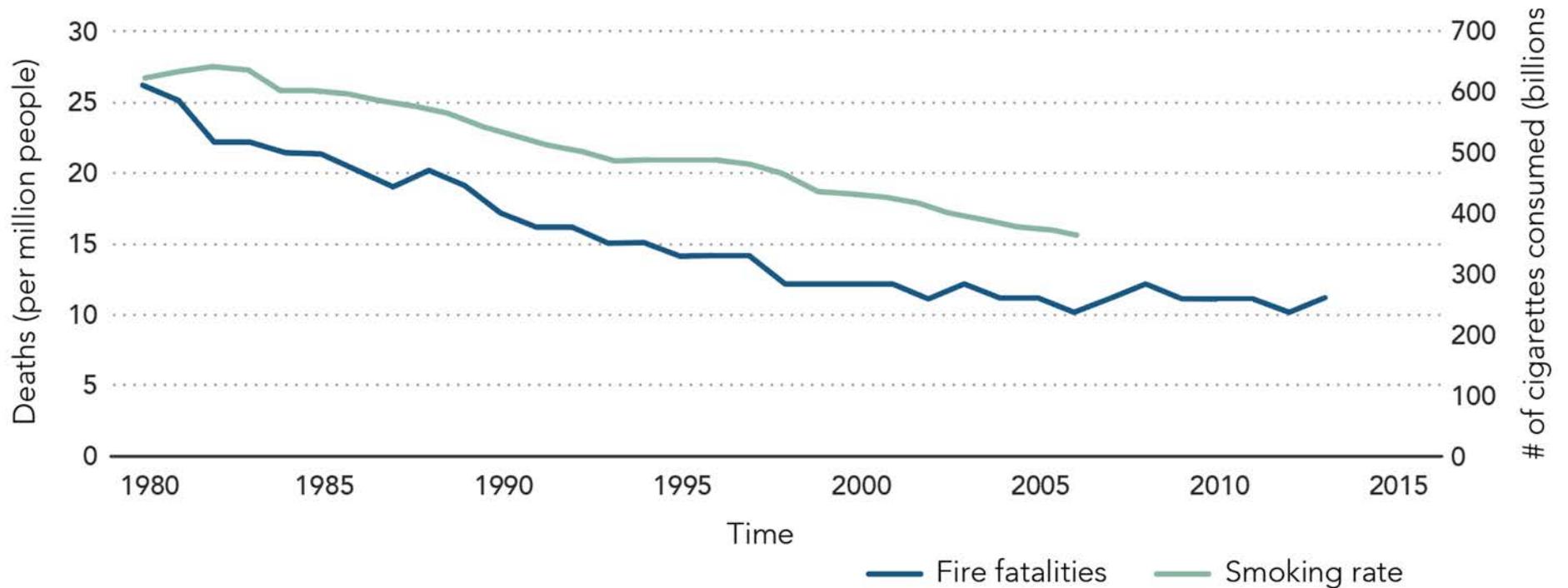
Annual fatalities related to the design of the built environment, U.S.



THEORY OF CHANGE

Smoking Rate and Fire Fatalities

In one generation, smoking deaths went down by 45% and fire deaths by 60%

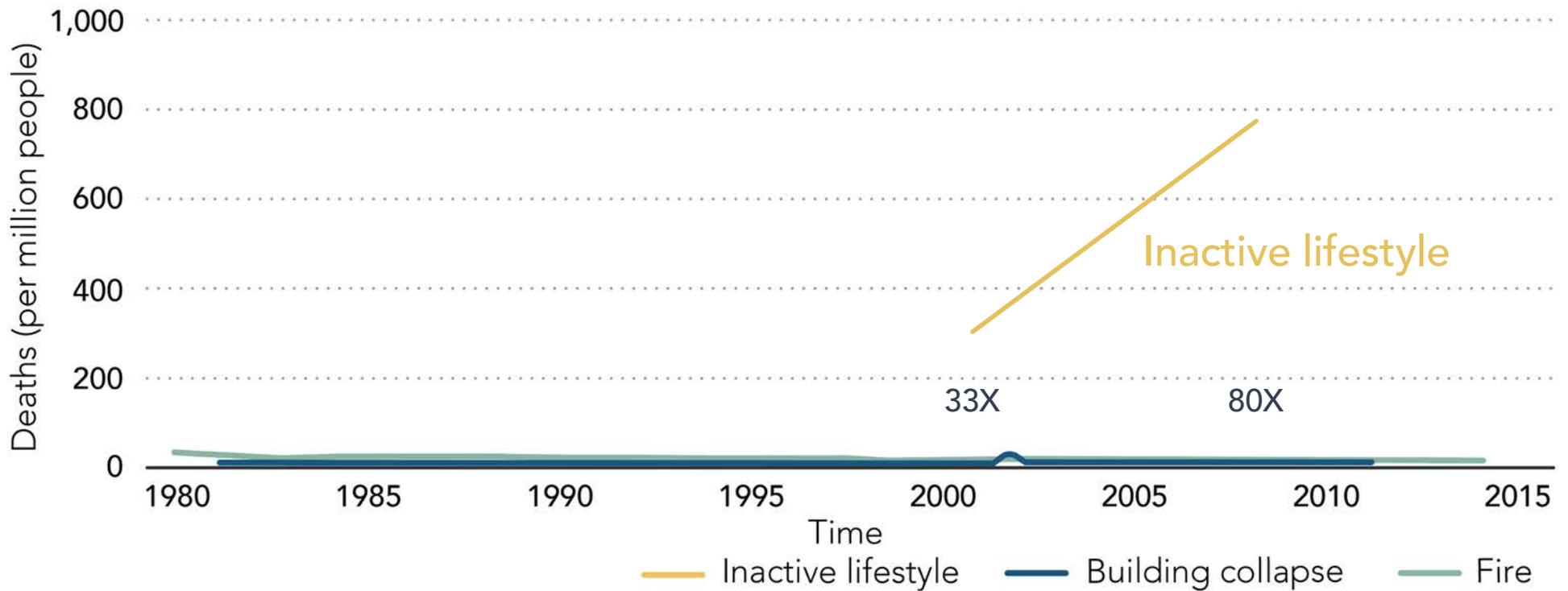


SOURCE: Xx

NATIONAL PROGRESS

THE NEW HEALTH, SAFETY, AND WELFARE

Annual fatalities related to the design of the built environment, U.S.



THEORY OF CHANGE



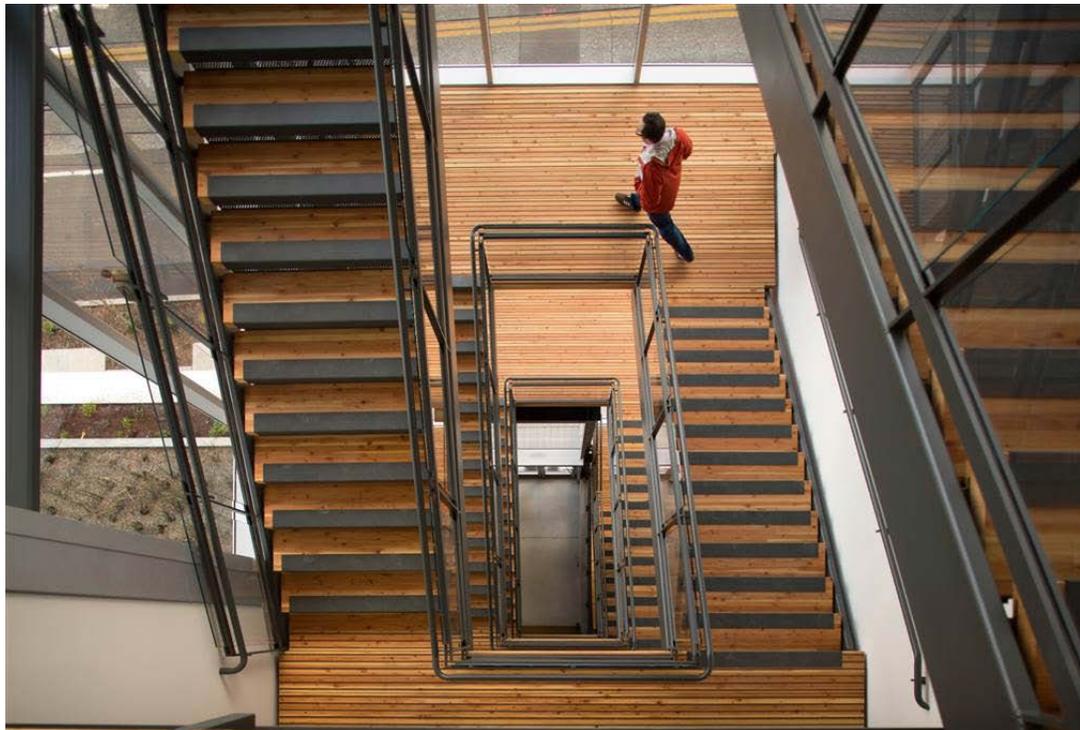
THE NEW, HEALTH, SAFETY AND WELFARE

How can the built environment better align with the public interest?



To improve public health, safety, and welfare in buildings, make at least one required fire stair open and inviting and start it in the lobby.

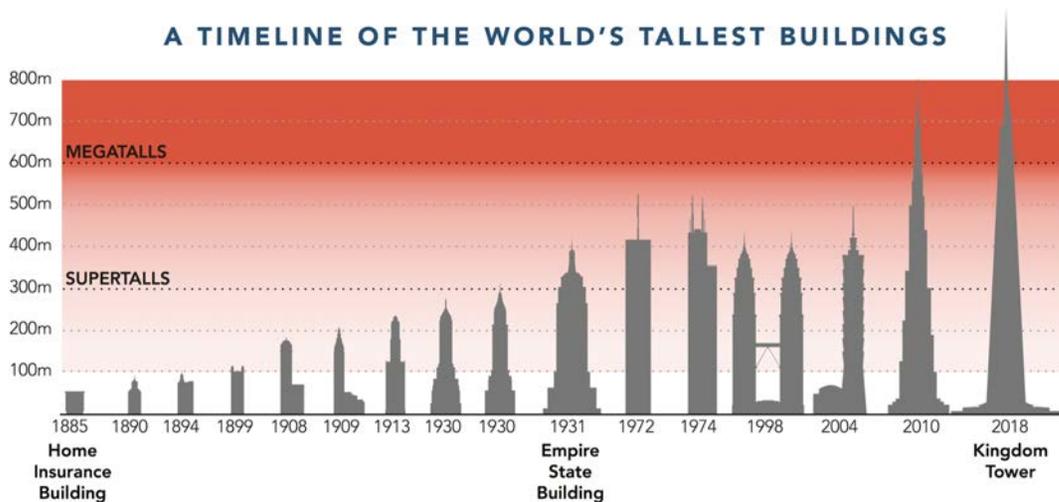
Climbing 20+ flights of stairs/wk lowered risk of stroke and death from all causes by 20%.



End the race to build the world's tallest buildings.

Just because you can doesn't mean you should.

A TIMELINE OF THE WORLD'S TALLEST BUILDINGS



13 REASONS WHY MEGATALL BUILDINGS FAIL TO UPHOLD THE NEW PUBLIC HEALTH, SAFETY, & WELFARE



HEALTH

1. Promotes physically-inactive lifestyles; discourages walking.
2. Limited ability to build community or social capital.
3. "Adverse effects on mental and social health."
4. More impersonal, less helping behavior, may account for suicides.



SAFETY

5. Street-oblivious; denies 'eyes on the street.'
6. "Crime and fear of crime are greater."
7. Lacks resilience; un-occupiable in case of power failure.
8. Conspicuous target.



WELFARE

9. Oblivious to local climate and culture, hostile to sustainability.
10. Extremely energy intensive to build and operate.
11. Misallocates development density away from street-scale vibrancy.
12. Create wind tunnels and cast long shadows.
13. Status-driven, rarely-occupied 'trophy' apartments for the superrich.

As the U.S. grows by 130,000,000 by 2100, will HSW still permit sprawl?



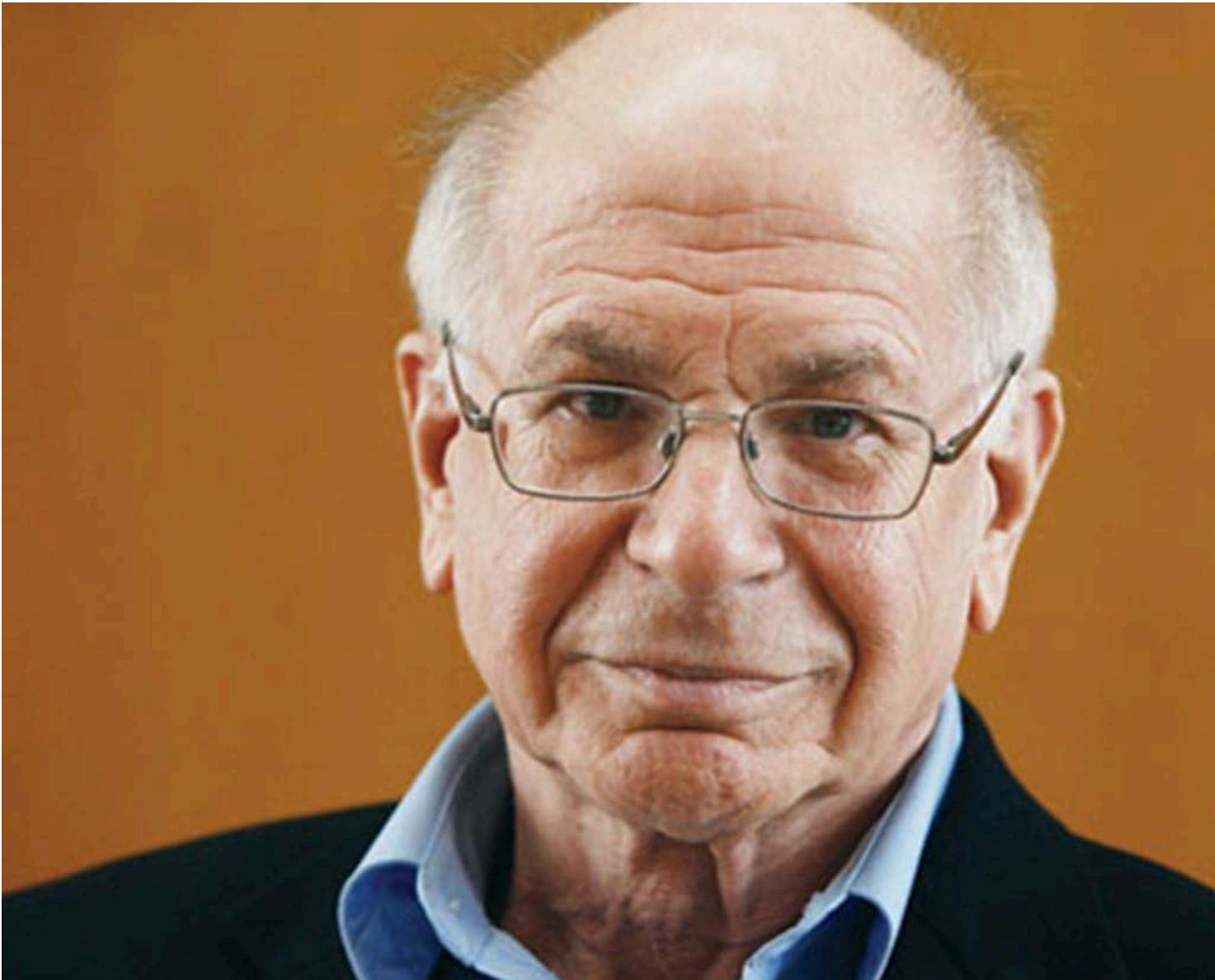
Room Poll: Health Safety and Welfare

What issues should Health Safety and Welfare address?

1. Building collapse and life safety (status quo).
2. Walkable communities/sprawl prevention.
3. Active living/obesity prevention.
4. Energy efficiency above EE code requirements.

A woman with long brown hair and blue eyes is looking upwards with a questioning expression. The background is a dark green chalkboard filled with white question marks. A blue horizontal band is overlaid across the middle of the image, containing the title text.

HEURISTICS & FRAMING



THE NEW YORK TIMES BESTSELLER

THINKING,
FAST AND SLOW



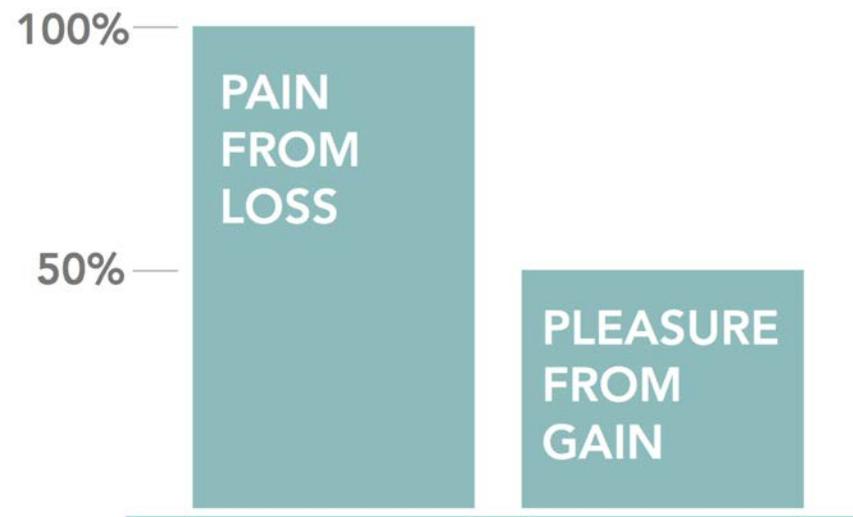
DANIEL
KAHNEMAN

WINNER OF THE NOBEL PRIZE IN ECONOMICS

"[A] masterpiece . . . This is one of the greatest and most engaging collections of insights into the human mind I have read." —WILLIAM EASTERLY, *Financial Times*

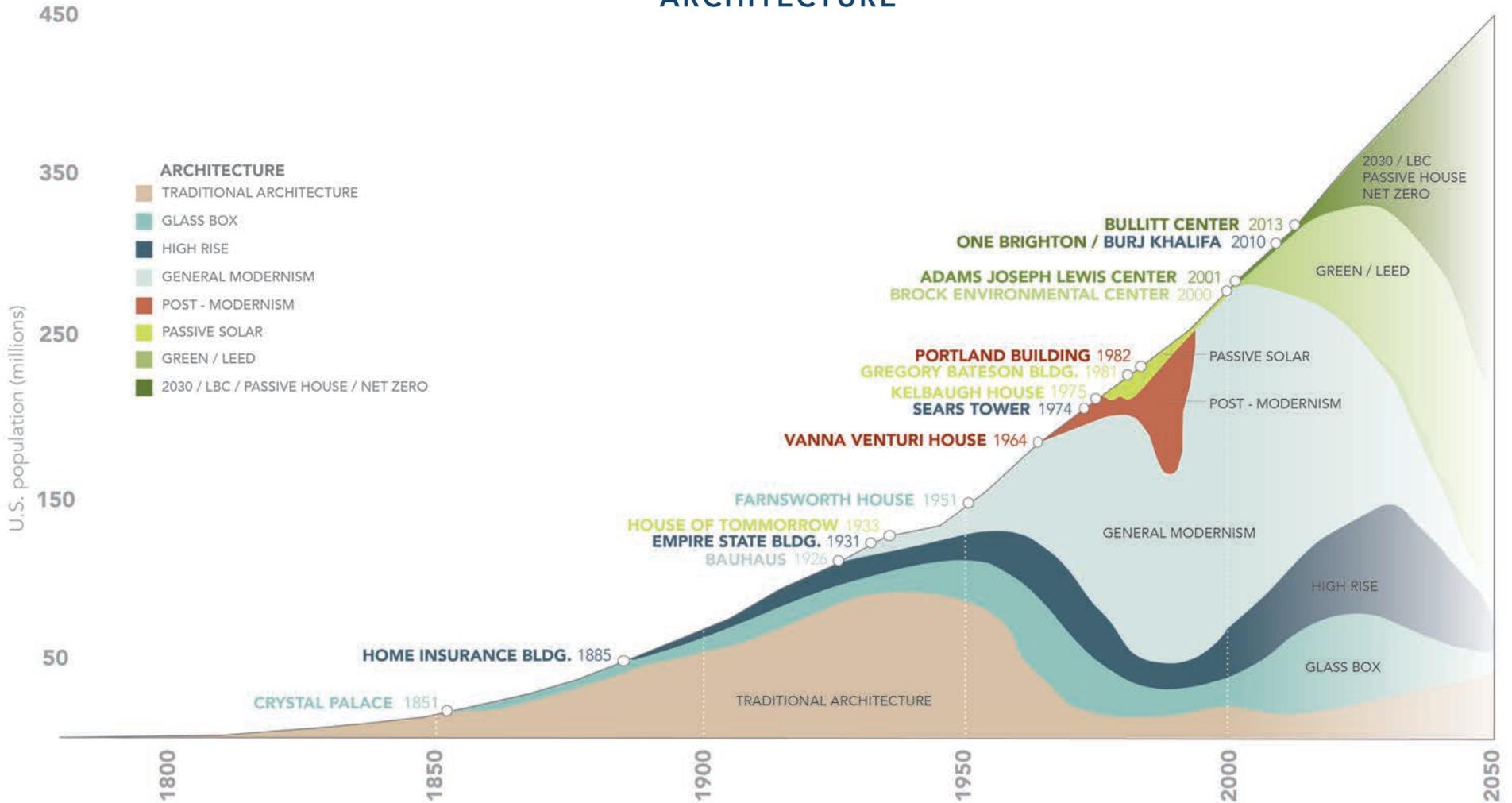
LOSS AVERSION | Loss is Worse than Gain

A loss is often valued more than an equal gain. For example, people who are given incentives up-front to meet a goal, and therefore have to give the incentive back if they fail to meet the goal, are significantly more likely to meet the goal than people given the incentive only after meeting the goal.



ACCELERANTS: HEURISTICS

THE RELATIVE INFLUENCE OF U.S. DESIGN MOVEMENTS OVER 250 YEARS: ARCHITECTURE



FARR ASSOCIATES - OUR NEW HSW



We strive to create an **equitable built environment** by helping **neighborhoods and communities** of all types achieve their full potential.

We work with a heightened focus on **active living, healthy environments,** and **places** that nurture lifelong connections to family and friends.

We design **lovable low/no carbon places and buildings** that accelerate change.

Terrie, 51

CAMPAIGNS

I want to give you some tips

CAMPAIGNS

A CONNECTED SERIES OF
OPERATIONS DESIGNED TO BRING
ABOUT A PARTICULAR RESULT.

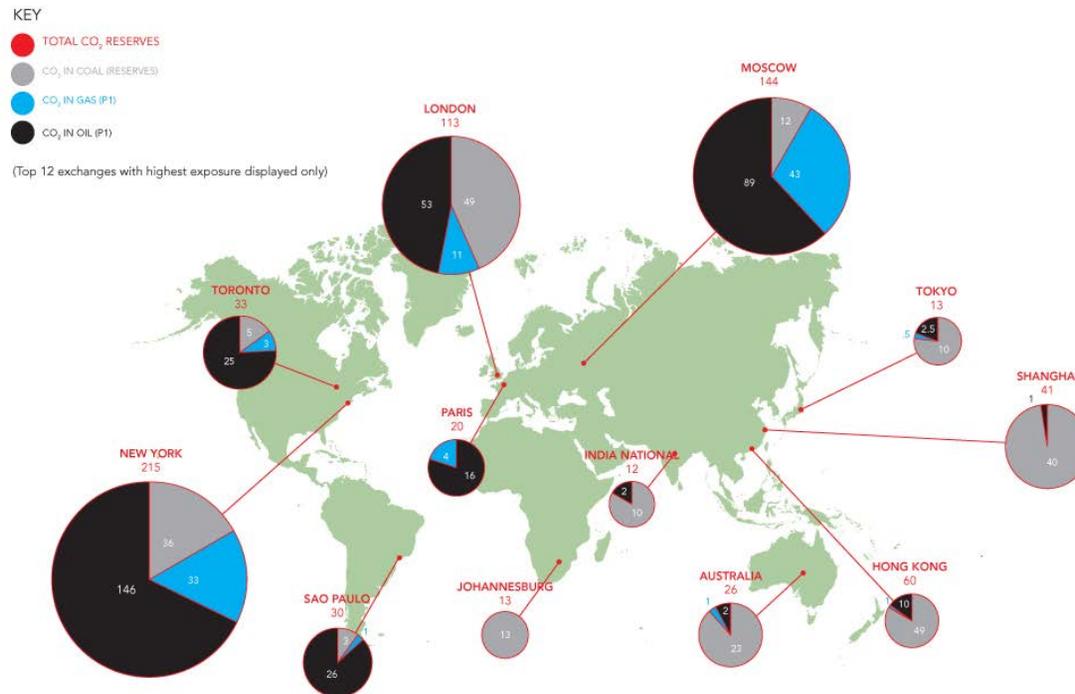


STRANDING CARBON

How can communities help bring about a post-carbon future?

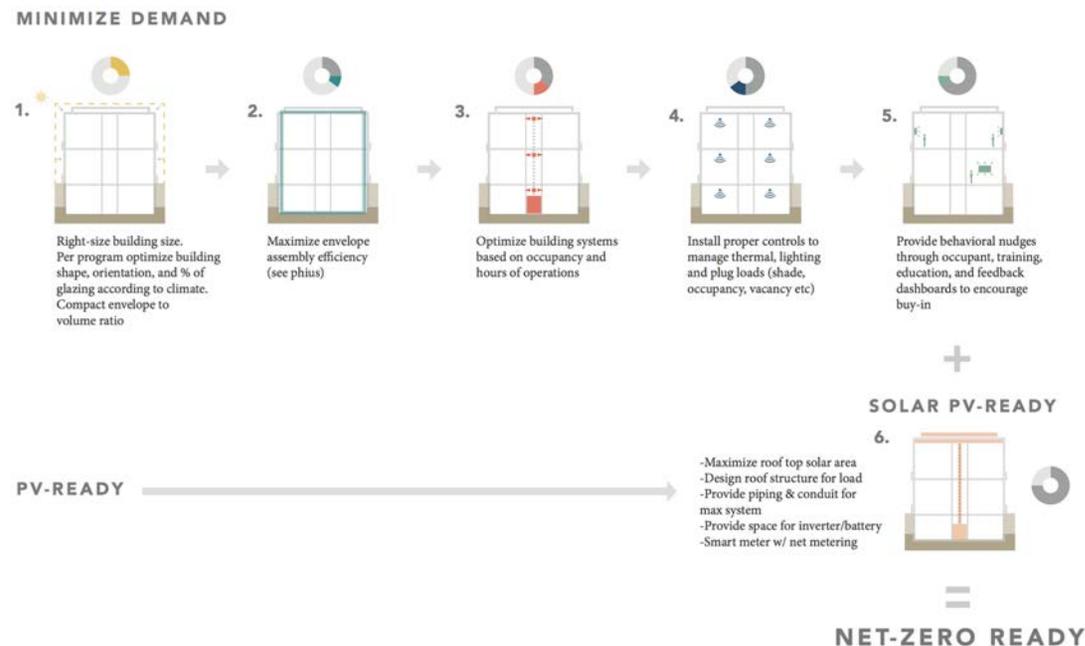
To abate climate change, **88%** of global coal reserves, **52%** of gas reserves and **35%** of oil reserves must remain in the ground.

MAP SHOWING THE GTCO₂ OF CURRENT COAL, OIL AND GAS RESERVES LISTED ON THE WORLD'S STOCK EXCHANGES.



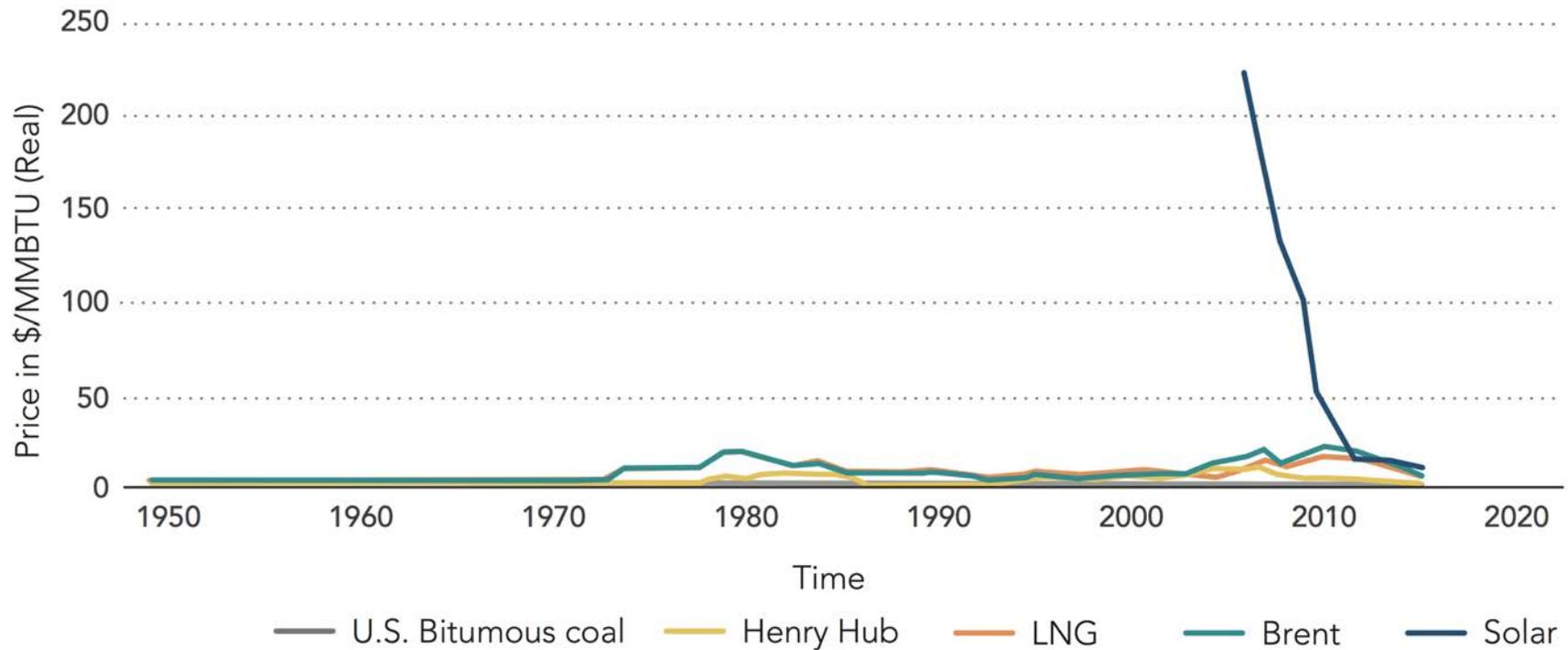
Position all buildings for the future by designing them to be net-zero energy ready.

Design every building project to use only the energy it can generate on its roof. Build in the capacity for rooftop PV's and purchase the system when the price is right.



The Falling Price of Photovoltaic Cells

For every doubling of work demand the price drops 20%.



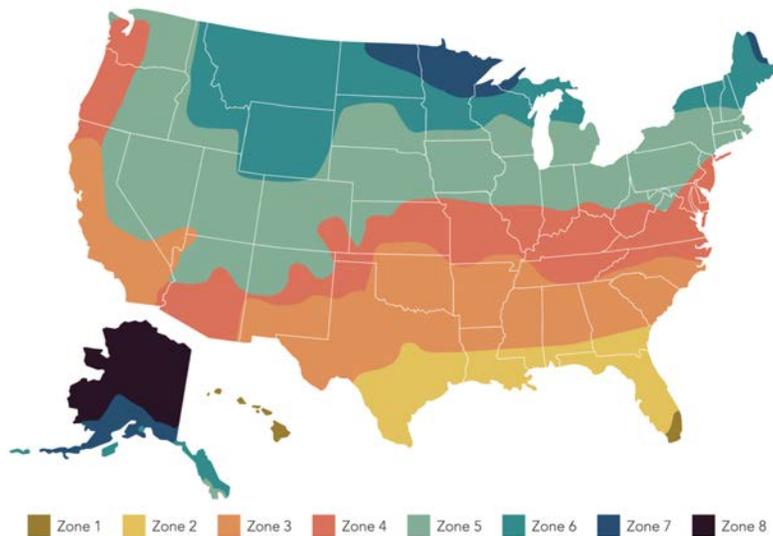
SOURCE: Bernstein Research 2014

GLOBAL PROGRESS

Approach every project as though PHIUS, the building energy code of the future, were in effect today.

If every building in the world met PHIUS standards, climate change could be limited to 2° C. PHIUS is required by code in cities across Europe and agencies within the U.S.

PHIUS+ 2015 PASSIVE BUILDING STANDARD CLIMATE ZONES



PHIUS+ 2015 Passive Building Standard Climate Zone Criteria

ZONE	ANNUAL HEATING DEMAND	ANNUAL COOLING DAYS	WP PEAK HEATING LOAD	WP PEAK COOLING LOAD	RECOMMENDED MAX WINDOW U VALUE
	1.0 — 12.2	1.0 — 18	0.8 — 5.9	2.5 — 5.5	0.09 — 0.27
1	1.0	18	0.8	5.2	0.27
2	1.7	13	2.9	5.5	0.27
3	2.5	7.8	3.5	5.3	0.21
4	4.5	4.9	4.2	4.6	0.16
5	5.8	2.7	4.8	4.3	0.14
6	7.3	1.5	5.5	3.9	0.12
7	8.9	1.0	5.5	3.3	0.12
8	12.2	1.0	5.9	2.5	0.09

Optimal glazing for buildings is a window-to-wall ratio of approximately 40%.

Subtitle goes here.

ENERGY USE INTENSITY ACROSS BUILDING TYPES & WINDOW-TO-WALL RATIOS (%)





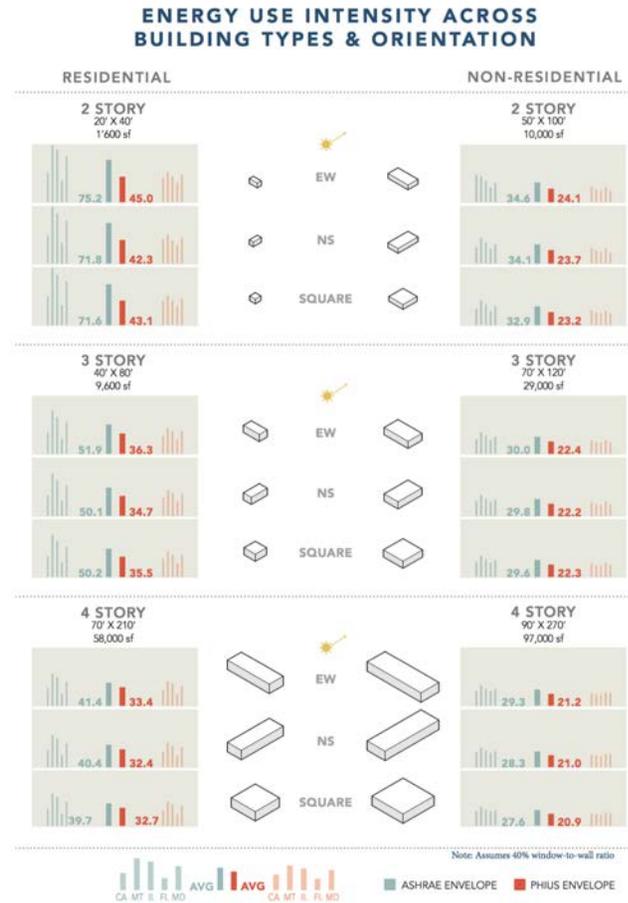
80%+ facade glazing



+/- 40% wall glazing

Build larger buildings, preferably thin, don't sweat orientation*.

EUI reduction: **36** – **45%** for residential, **15** – **26%** for commercial



ASHRAE
PHIUS

Room Poll: Firm Sustainability Leadership

Who in your firm sets sustainability policy?

1. No one
2. Firm leadership/Principals
3. Project Managers
4. Sustainability specialists
5. Emerging professionals.



PATTERN PROJECT

A Farr Associates Initiative to Accelerate Change

Carbon-Free Chicago 2050



**PATTERN
PROJECT**

**At sunrise on January 1, 2051
Chicago will no longer burn
fossil fuels to power buildings,
vehicles, or the grid.**



**50% of Chicago
Firms pledge to use
2030 Commitment
in 2018**

**City of Chicago
Net-zero-energy
(NZE) Code by 2030**

**Carbon-Free
Chicago by 2050**



2030
COMMITTED

Thank you