

# Greentown

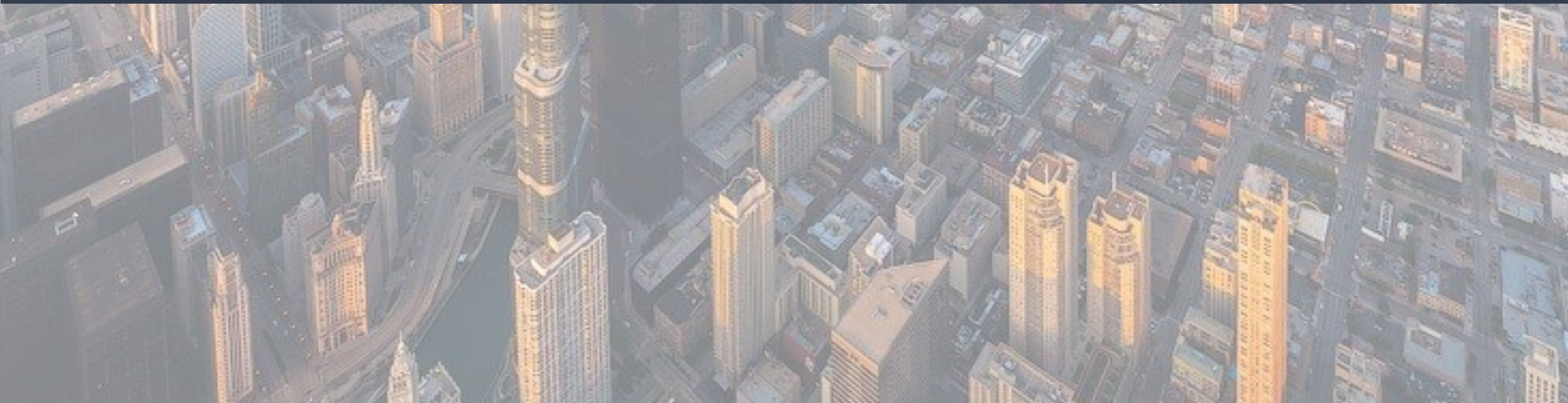
This session will highlight Carbon Free Chicago (CFC), a newly-launched, thirty-year campaign for the prompt and equitable decarbonization of Chicago. The campaign was launched with a clear vision of success in mind: *“By sunrise on January 1, 2051 Chicagoans will no longer burn fossil fuels to heat or power our buildings, vehicles, or grid.”* The campaign is organized around a Theory of Change (TOC) based on the answers to three key questions: 1) what cultural, technological, and legislative milestones must Chicago achieve on the path to Decarbonization; 2) how can decarbonization happen equitably and efficiently; and 3) how, and in what order, can these milestones be achieved as quickly as possible? Doug Farr, lead organizer of CFC, will outline the initiative’s Common Agenda, and engage panelists in a discussion around equity and these core questions.





# CARBON-FREE CHICAGO

GREENTOWN, WEDNESDAY SEPTEMBER 30, 2020



# Carbon-Free Chicago

CFC is a 30-year campaign  
for the *timely and equitable transition*  
to a decarbonized Chicago.



# Today's talk addresses three questions:

1. What **cultural, technological, and legislative milestones** must Chicago achieve on the path to Decarbonization?
2. How can decarbonization happen **equitably and efficiently**; and
3. **How, and in what order, can these milestones be achieved** as quickly as possible?

# A Future Free of Fossil Fuels

Carbon Free Chicago operates on the belief that ending our dependence on fossil fuels will create  
**A Healthy and Prosperous Future for All Chicagoans.**





# The City of Chicago Declared A Climate **Emergency!**





The American Institute of Architects  
Declared A Climate **Emergency!**



Source: CAIT Climate Data Explorer

We need to stop producing CO2 really fast.

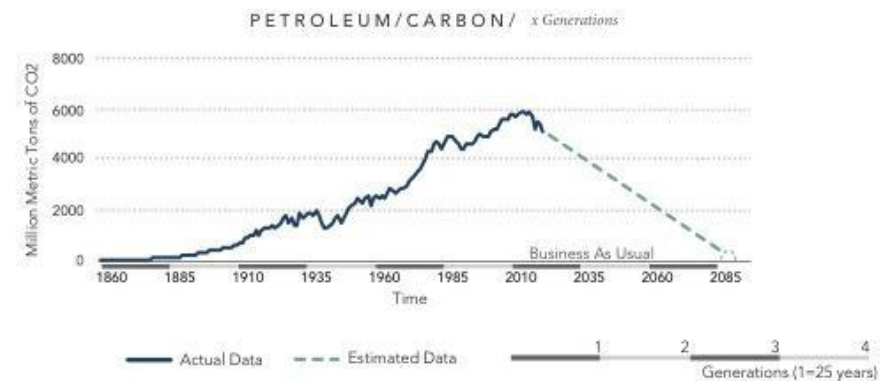
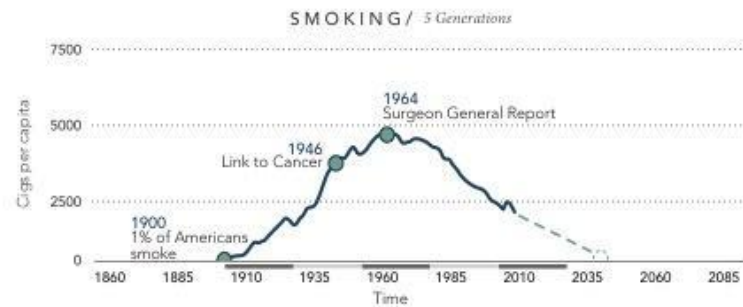
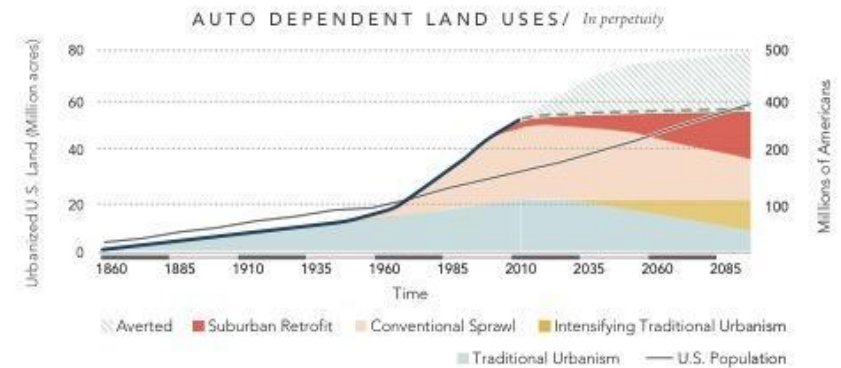
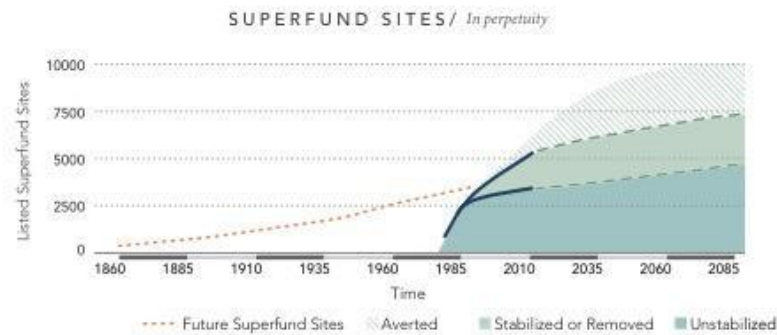
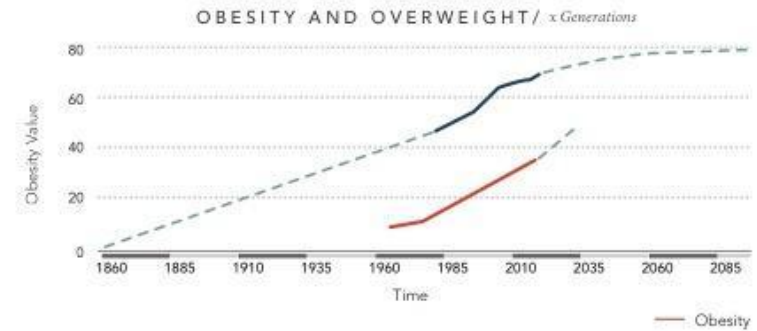
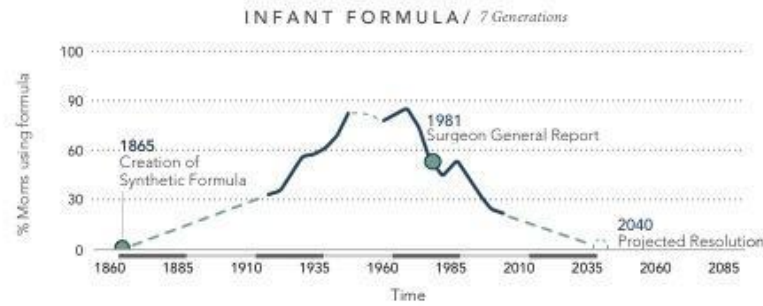


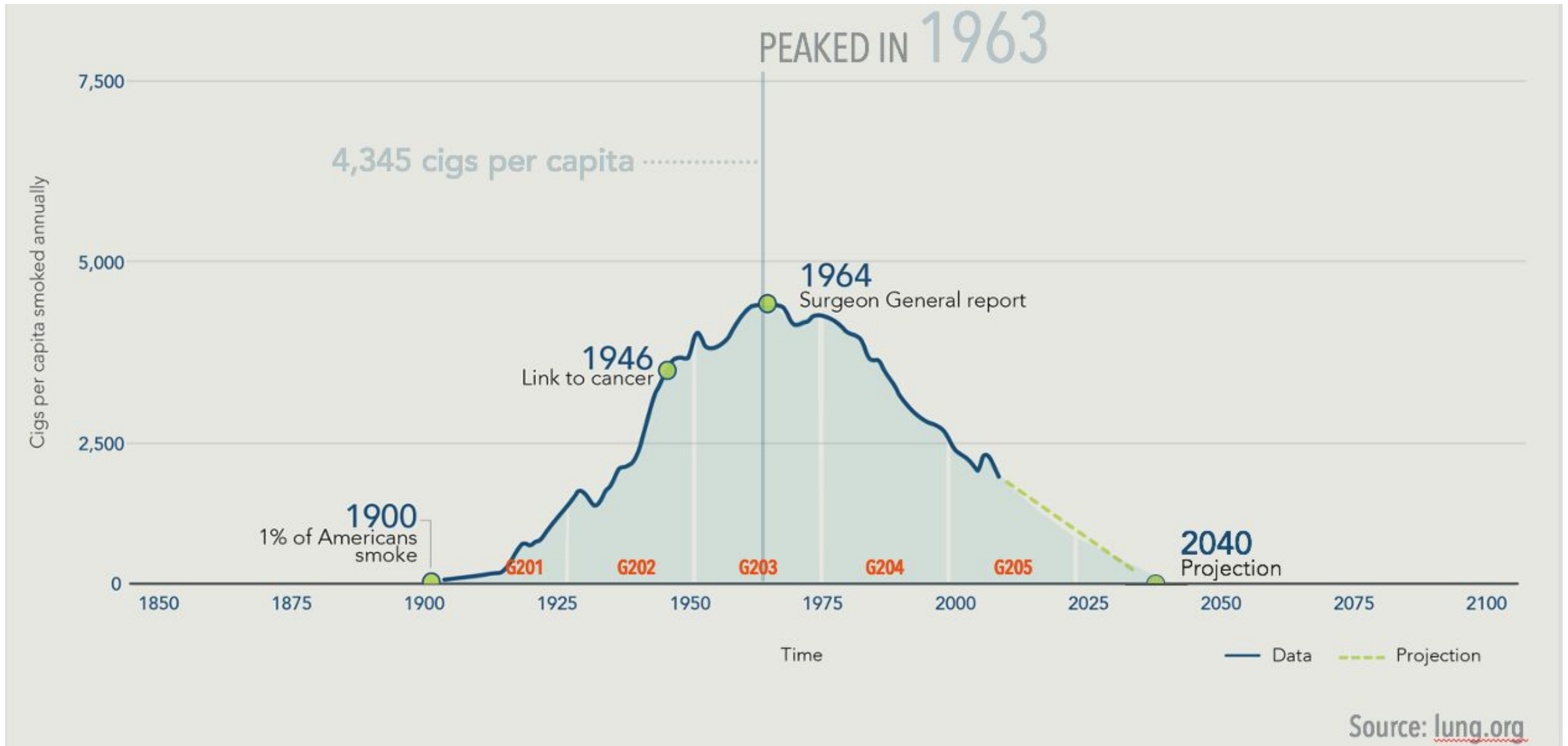


Source: CAIT Climate Data Explorer

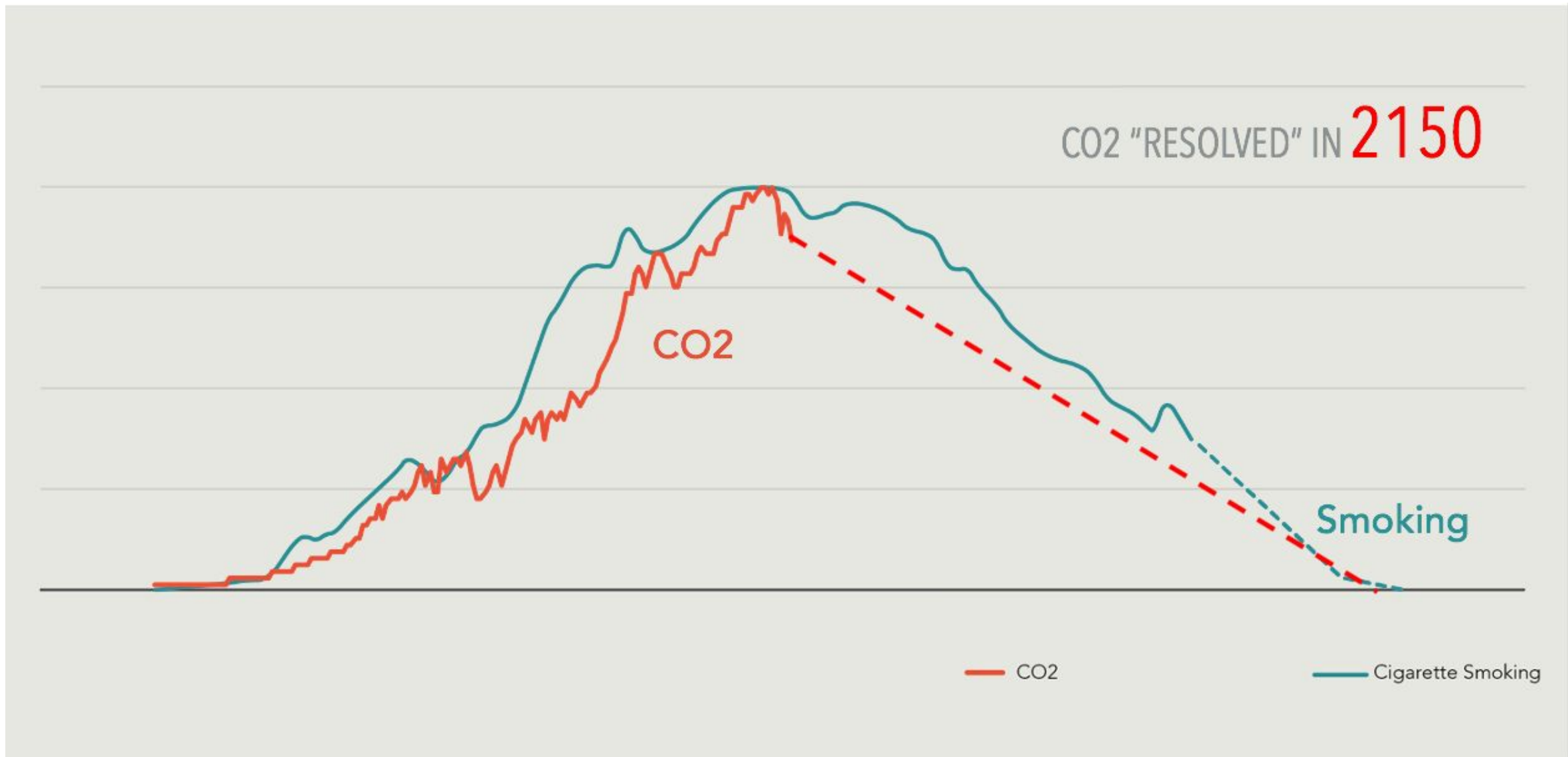
When will the US economy decarbonize? (Chat)

# Changelines: A Tool for Comparing the Pace of Change





Smoking cessation is the best we've ever done.



G: Decarbonizing at the rate we quit smoking would take 130 yrs.

Time is our scarcest resource,  
and for the good of us all, LET'S ACT LIKE IT.

What do we need to do?



# FLATTEN THE CURVE

CO<sub>2</sub>  
^

DAILY NUMBER OF CASES



TIME SINCE FIRST CASE

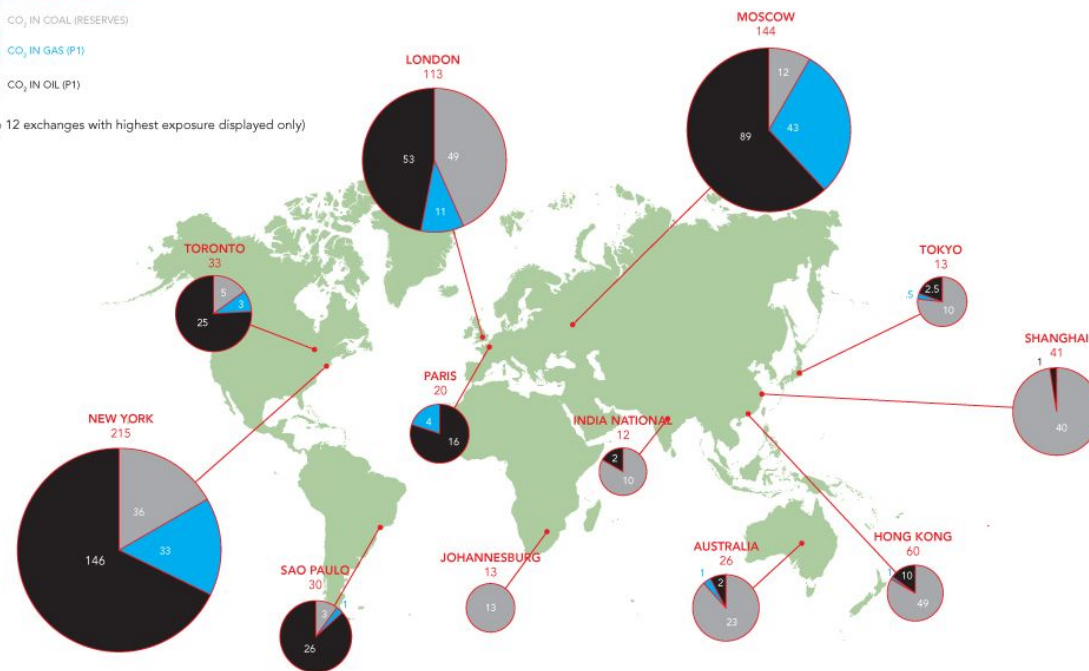
# We need to strand fossil fuels underground

MAP SHOWING THE GTCO<sub>2</sub> OF CURRENT COAL, OIL AND GAS RESERVES LISTED ON THE WORLD'S STOCK EXCHANGES.

KEY

- TOTAL CO<sub>2</sub> RESERVES
- CO<sub>2</sub> IN COAL (RESERVES)
- CO<sub>2</sub> IN GAS (P1)
- CO<sub>2</sub> IN OIL (P1)

(Top 12 exchanges with highest exposure displayed only)

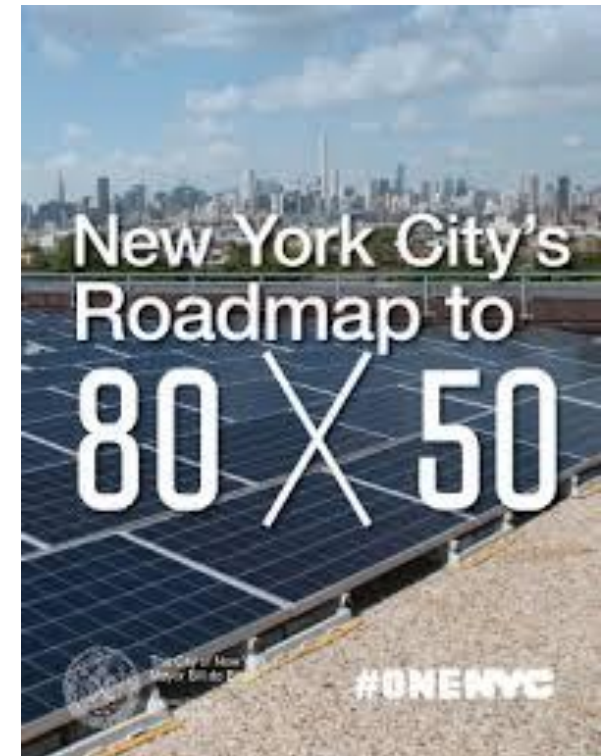


© Carbon Tracker & Grantham Research Institute, LSE 2013

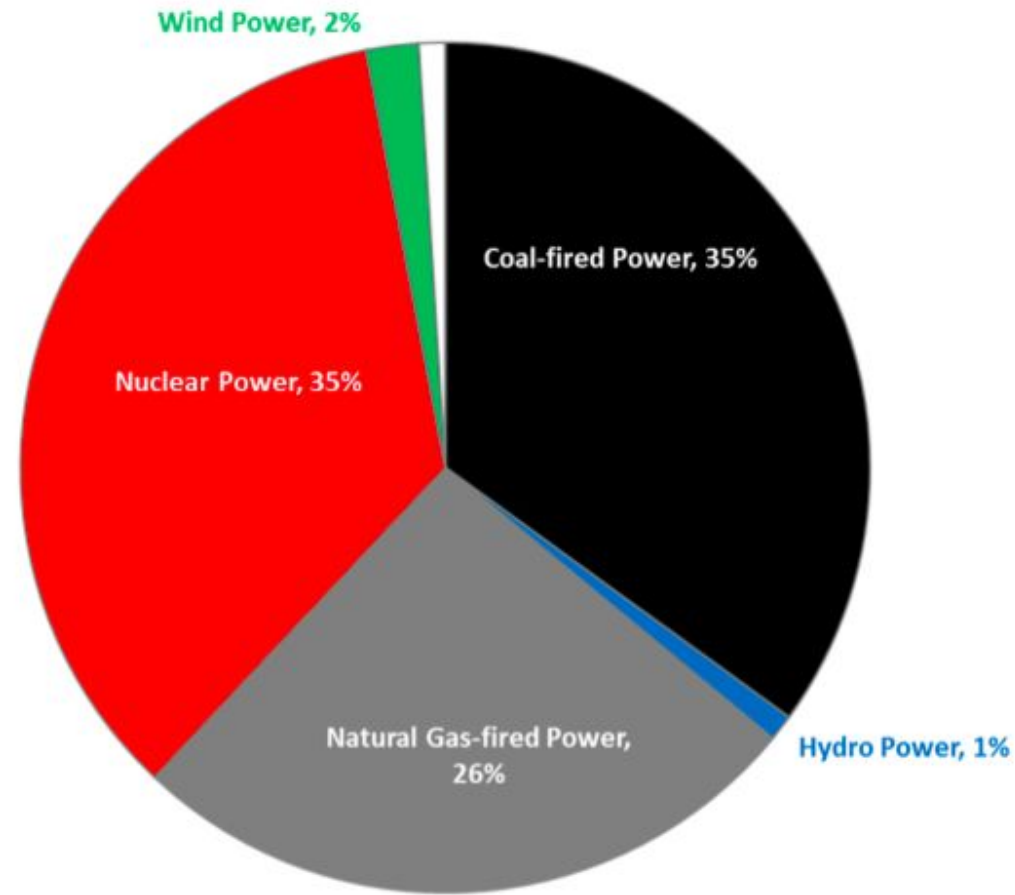
To abate climate change, **88%** of global coal reserves, **52%** of gas reserves and **35%** of oil reserves must remain in the ground.



Science does not support **any** ongoing use of



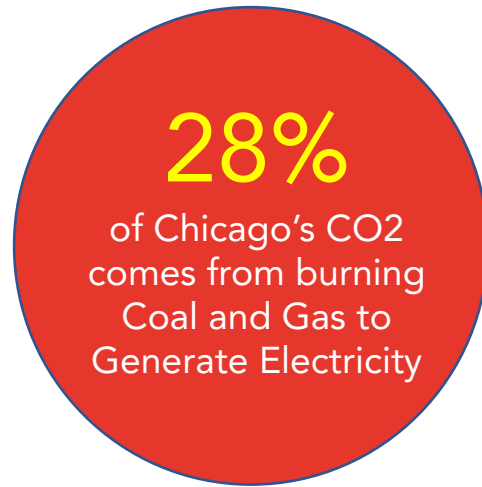
# We need to clean up our electric grid



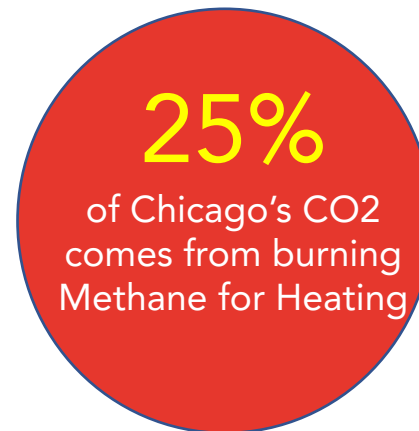
ComEd's Electricity is 61% Fossil Fueled

# What are the big targets for reducing fossil fuels.

## ELECTRICITY



## HEATING



## GASOLINE & DIESEL

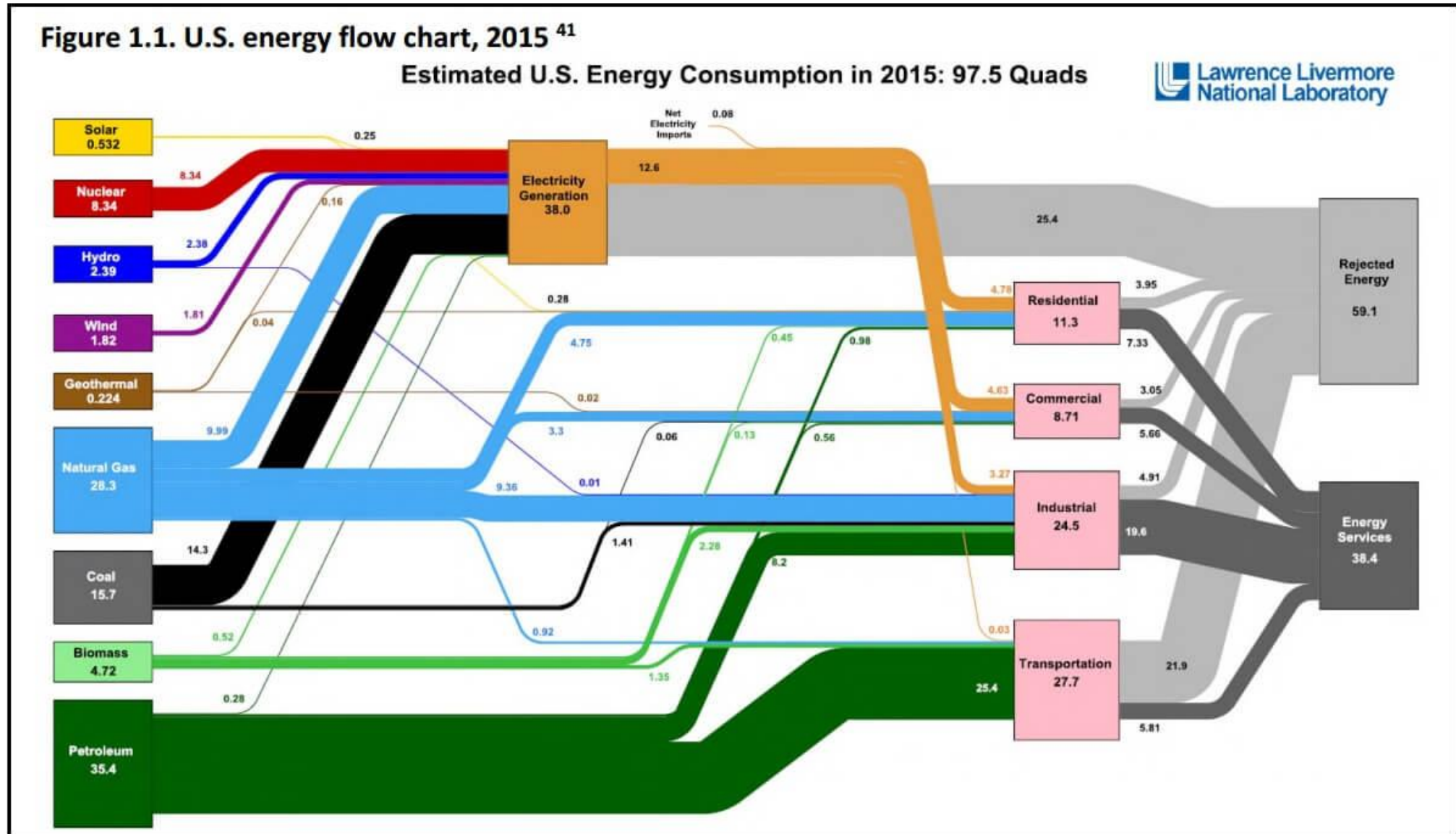


ComEd's Electricity is **61%** FF    WEC/People's Gas is **100%** FF

Petroleum is **100%** FF



# We Waste Most of The Energy We Produce



# Four Pillars of the ENERGY REVOLUTION

## CONSERVATION ELECTRICIFICATION DECARBONIZATION SYNCHRONIZATION

### CONSERVATION

LIVE BETTER ON HALF THE ENERGY

BE HAPPY  
EXPERIENCES AND RELATIONSHIPS TRUMP CONSUMPTION

LONG DISTANCE TRAVEL  
GET AROUND  
GET AROUND ON YOUR OWN  
GET AROUND ON YOUR OWN  
SO.V.  
RIGHT SIZE  
FLEX SPACE, NOT TOO BIG HOUSE, LESS STUFF  
SUMMER HOUSES AND FLATS  
MCMANSION  
SMALLER ST./REDO.  
SHUG AS A BOG  
LOFT  
EFFICIENT BUILDINGS CAN USE 50-75% LESS ENERGY

OLD LEAKY HOUSE  
HIGHER EFFICIENT GAS HEATING FOR 30-40 YEAR OLD HOUSES  
PASSIVE BUILDING

**Live better on half the energy**

### ELECTRIFICATION

REPLACE GAS-BURNING DEVICES WITH ELECTRIC

GAS CAR  
ELECTRIC CAR

CHIMNEY  
SOLAR PANELS

BOILER/FURNACE  
HEAT PUMP

NUCLEAR  
HEAT SINKS  
CONCRETE COOLING

**Swap gas devices for electric ones**

### DECARBONIZATION

GENERATE ELECTRICITY WITHOUT FOSSIL FUELS

LEAVE ALL COAL RESERVES UNDERGROUND

LEAVE ALL GAS & OIL RESERVES UNDERGROUND

HARVEST THE SUN AND LOVE WINDS

RETAIN NUCLEAR POWER AS A BRIDGE FUEL

DESPITE REAL RISKS NUCLEAR POWER IS THE SAFEST SOURCE OF ENERGY AND PRESENTS NO CREDIBLE CASE

**Produce electricity cleanly (w/o burning fossil fuels)**

### SYNCHRONIZATION

TIMING IS EVERYTHING

USE ENERGY WHEN IT IS MADE

	SUMMER (JUNE 21)	WINTER (DEC 21)	ANNUAL
WHEN THE SUN SHINES			
WHEN THE WINDS BLOW			
AND THEN NUCLEAR			

STORE ENERGY FOR WHEN IT'S NOT.

USE ENERGY WHEN IT IS PRODUCED OR STORE IT FOR LATER

SHAVE PEAK USE BY ALWAYS HAVING STORAGE

	CHICAGO TODAY	CALIFORNIA TODAY	DECARBONIZED BOSTON 2050
ANNUAL			
PEAK DAY			

**Use energy when it is produced or store it for later**

# CFC: The Thirty-Year Vision

**By sunrise on Earth Day 2050 Chicagoans will no longer burn fossil fuels to power or heat buildings, vehicles, industry, or the grid.**

How can we meet this ambitious  
decarbonization goal?

CFC Theory of Change?



# TOC STEP ONE: Milestones.

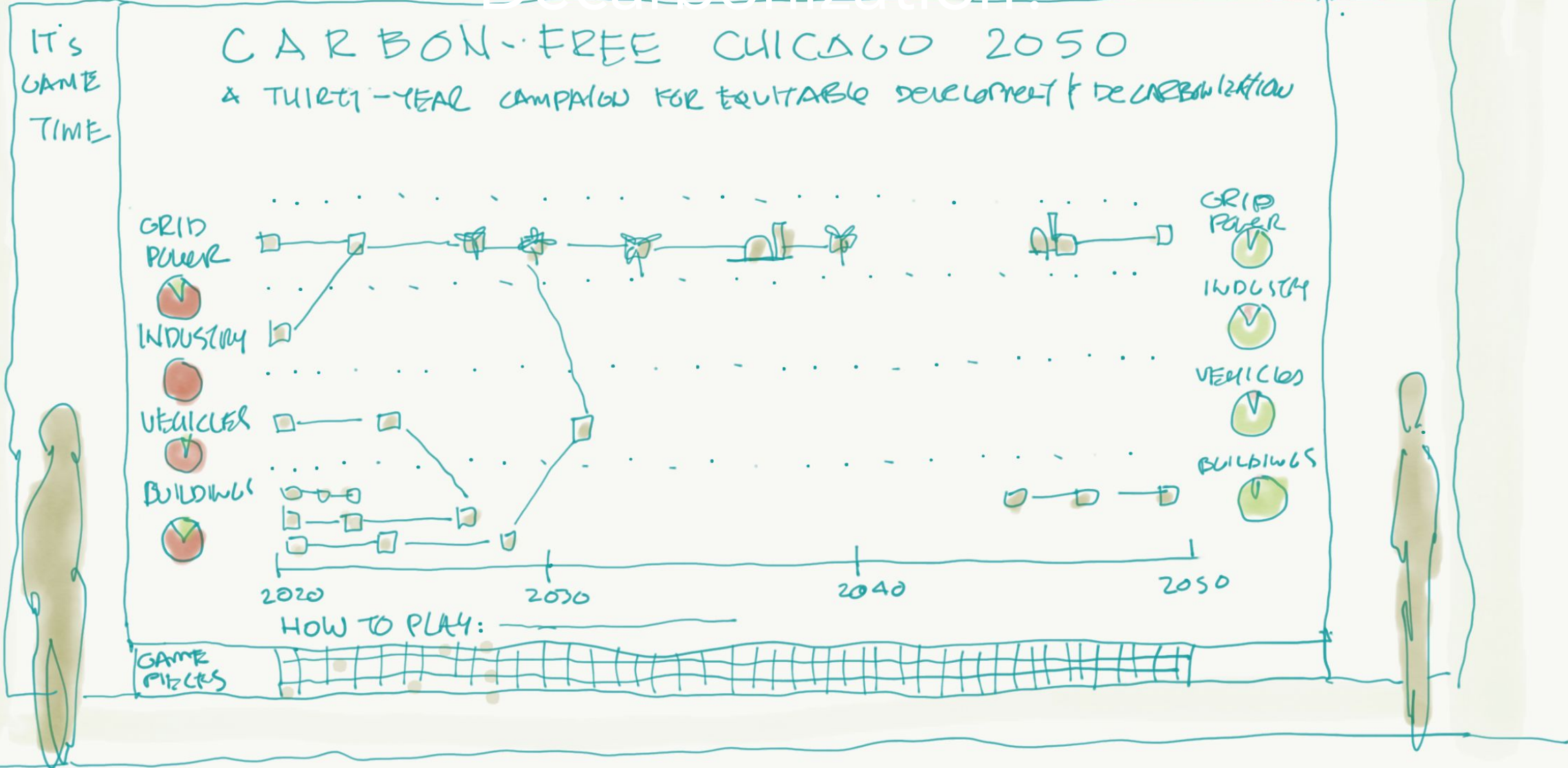
Cultural

Technological

Legislative

# What Milestones Must We Hit on the Way to

## Decarbonization?



# Cultural Decarb Milestones

# What Cultural Milestones are on the path to Decarbonization?

## Society at large

---

People are aware that **decarbonization is a choice**

Fossil-fuel free living is seen as better, **what the cool kids do.**

The **City of Chicago** gets serious about decarbonization.

Enviros and local celebrities (Mayor & Governor) undergo **Carbon Rehab**

Schoolkids want **to grow up to be Gasbusters!**

## The Architecture Profession

---

Architects are aware that **decarbonization is a choice**

Fossil-fuel free buildings provide the basis of **Design Excellence.**

**Professional standing** relies on the commitment to decarbonize

Midcareer architects feel compelled to **learn building science.**

**Architects decarbonize** their own homes and buildings

## The Disenfranchised

---

People "get" the link between their **respiratory health** and fossil fuels

People understand that fossil fuels are **cheap but harmful**

**Spiraling gas rates** from a shift to electric seen as a threat to low-income households.

Franchise agreements and state legislation **fund an equitable transition**

Eliminating oil refineries is seen **the ultimate in environmental justice.**

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Decarbonization

  
Doors

Windows

Plumbing  
Faucets  
Appliances  
Kitchen  
Patio

30


  
Gasbusters

Wood Working  
Sanding  
Moulding  
Blue Print

Clearance  
Liquidation


Clearance  
Liquidation

  
Faster

 Nuts & B

 Specialty  
Fasteners

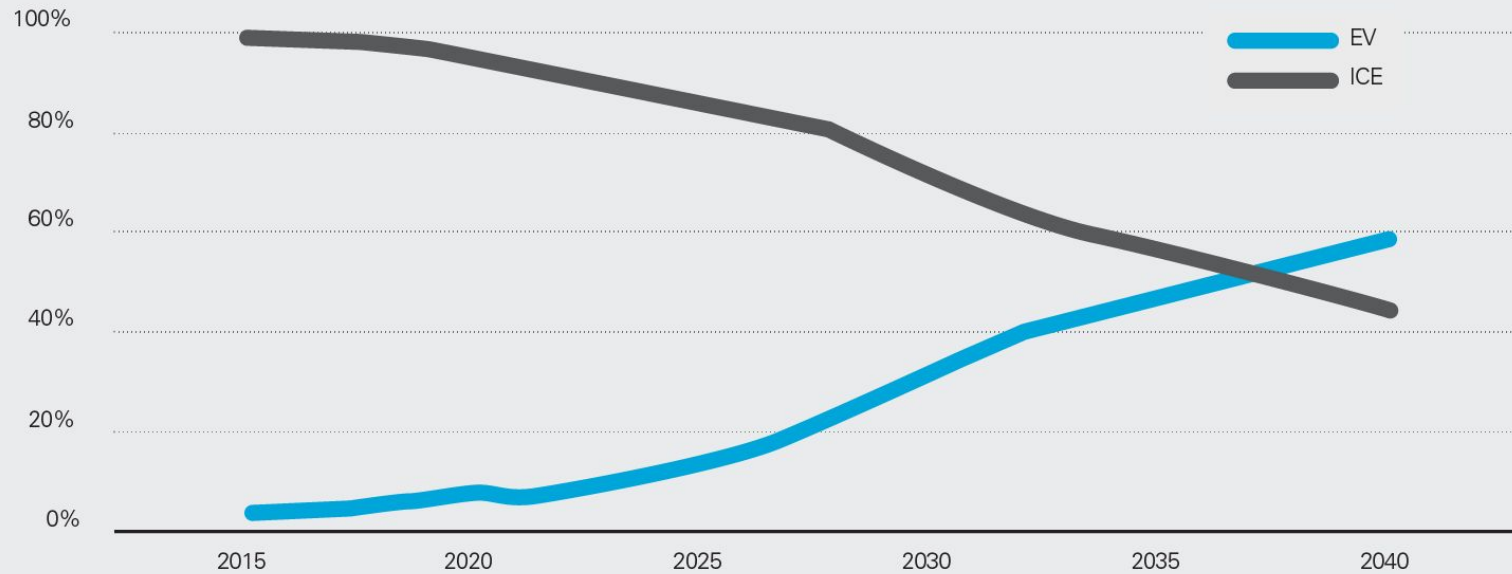
 Rope &

 Tie Down

# Swap electric for gas burning vehicles

## Global EV and ICE share of long-term passenger vehicle sales

Share of annual sales



Source: BloombergNEF



Gas-burning vehicles



Electric-powered vehicles



# Replace Gas-Burning with Heat Pump Appliances

Hot water heating



Space heating



Clothes drying



Gas-burning



Heat Pump



# Cook with Electric Induction



Gas



Heat  
Pump







# The AIA 2030 Challenge

**A “button” campaign started in 2017 has increased from 12% to 28% the number of AIA Chicago firms pledging to track their project’s energy use. These represent 1/6 of all firms nationally enrolled in the program.**

# AIA 2030 Challenge

## 125 Pledged AIA Chicago Member Firms represent 1/7 of US total

Adrian Smith + Gordon Gill Architecture	Farr Associates	KTGY Group, Inc.	SMNG A Ltd.
aecom	FGM Architects	Lamar Johnson Collaborative	Solomon Cordwell Buenz
Antunovich Associates	FGP Atelier International LLC	Landon Bone Baker Architects (LBBA)	SOM (Skidmore Owings & Merrill)
Architecture Is Fun, Inc.	Fitzgerald Architecture Planning Design, Inc	Laura Garcia Design, Architecture   Consulting	SPACE Architects + Planners
Bailey Edward	Gary Lee Partners	Legat Architects	STL Architects
bKL Architecture LLC	GastingerWalker&	Lothan Van Hook DeStefano Architecture	STRABALA+Architects LLC
BKV Group	Gensler	Map Lab, Inc.	Studio Dwell Architects
Booth Hansen	Ghafari Associates, LLC	MIR Collective, LLC	Studio Gang Architects
Brininstool + Lynch, Ltd.	Goettsch Partners	MKB Architects	Studio Nigro
BRUSH Architects, LLC	GREC	Morgante Wilson Architects	StudioGC
Burhani Design, Inc.	Harboe Architects, PC	Muller & Muller, LTD.	Symbiotic Living Architecture + Design
BuroHappold Engineering	Harley Ellis Devereaux	Neet Architecture LLC	Thomas Roszak Architecture
CallisonRTKL	Hartshorne Plunkard Architecture	NELSON Worldwide LLC	Tilton, Kelly + Bell, L.L.C.
Cannon Design	HBRA Architects	Odile Compagnon Architect	tvdesign
Canopy Architecture + Design	HDR	P.K. VanderBeke, Architect	UrbanLab
Clayco / LLC	Hirsch MPG LLC	Pappageorge Haymes Partners	UrbanWorks, Ltd.
CLUAA	HKS	Partners by Design	Valerio Dewalt Train Associates
Cordogan Clark & Associates Architects Engineers	HOK Inc.	Paul Pettigrew Architect	Vinci/Hamp Architects Inc.
dbHMS	Holabird & Root	Perkins + Will	Vladimir Radutny Architects
Design Organization	HPZS	Perkins Eastman	VOA Associates Inc.
DesignBridge, Ltd.	Huntsman Architectural Group	PositivEnergy Practice	von Weise Associates
Dirk Denison Architects	HUSarchitecture	RATIO Architects	Weese Langley Weese Architects Ltd.
DLR Group	IA Interior Architects	Rivetna Architects Inc.	WEISS ARCHITECTS, LLC
DMAC Architecture	Interface Engineering, Inc	Ross Barney Architects	Wheeler Kearns Architects
dSPACE Studio	JAHN	Saltans Architects_International, Ltd.	Wight & Company
Earles Architects and Associates	JGMA	Searl Lamaster Howe Architects	Willoughby Engineering - merged with WSP
Eckenhoff Saunders Architects	John DeSalvo Design	Serena Sturm Architects	Woodhouse Tinucci Architects
Ellipsis Architecture	John Ronan Architects	Sheehan Nagle Hartray Architects	Wrap Architecture
Engberg Anderson Architects	Jurassic Studio	Shive-Hattery	Wright Heerema Architects
Epstein	Kipnis Architecture + Planning	Sink Combs Dethlefs - merged with Perkins + Will	
EXP	KOO LLC	Skender	
	Krueck + Sexton Architects	SmithGroup	

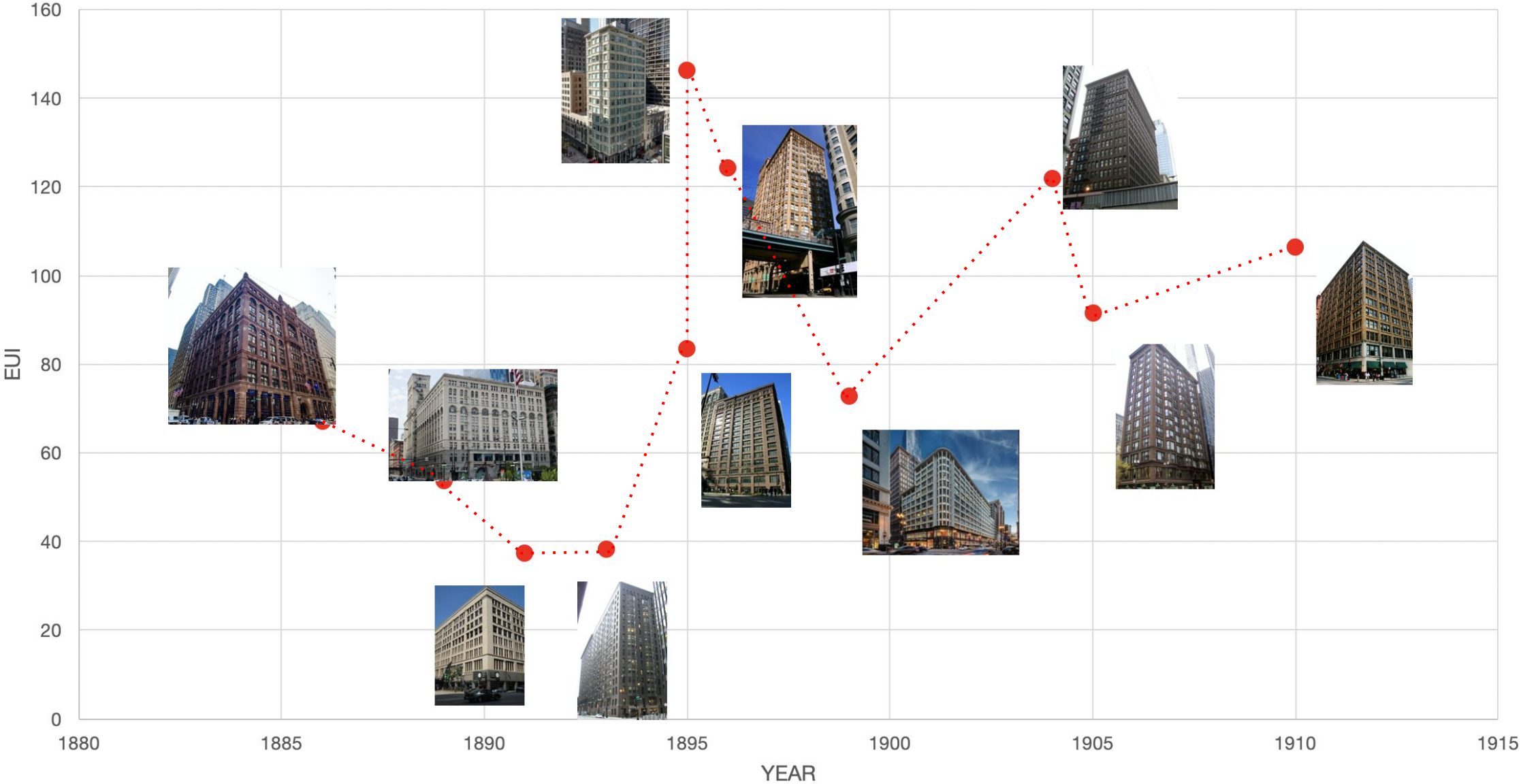




# Technical Decarb Milestones

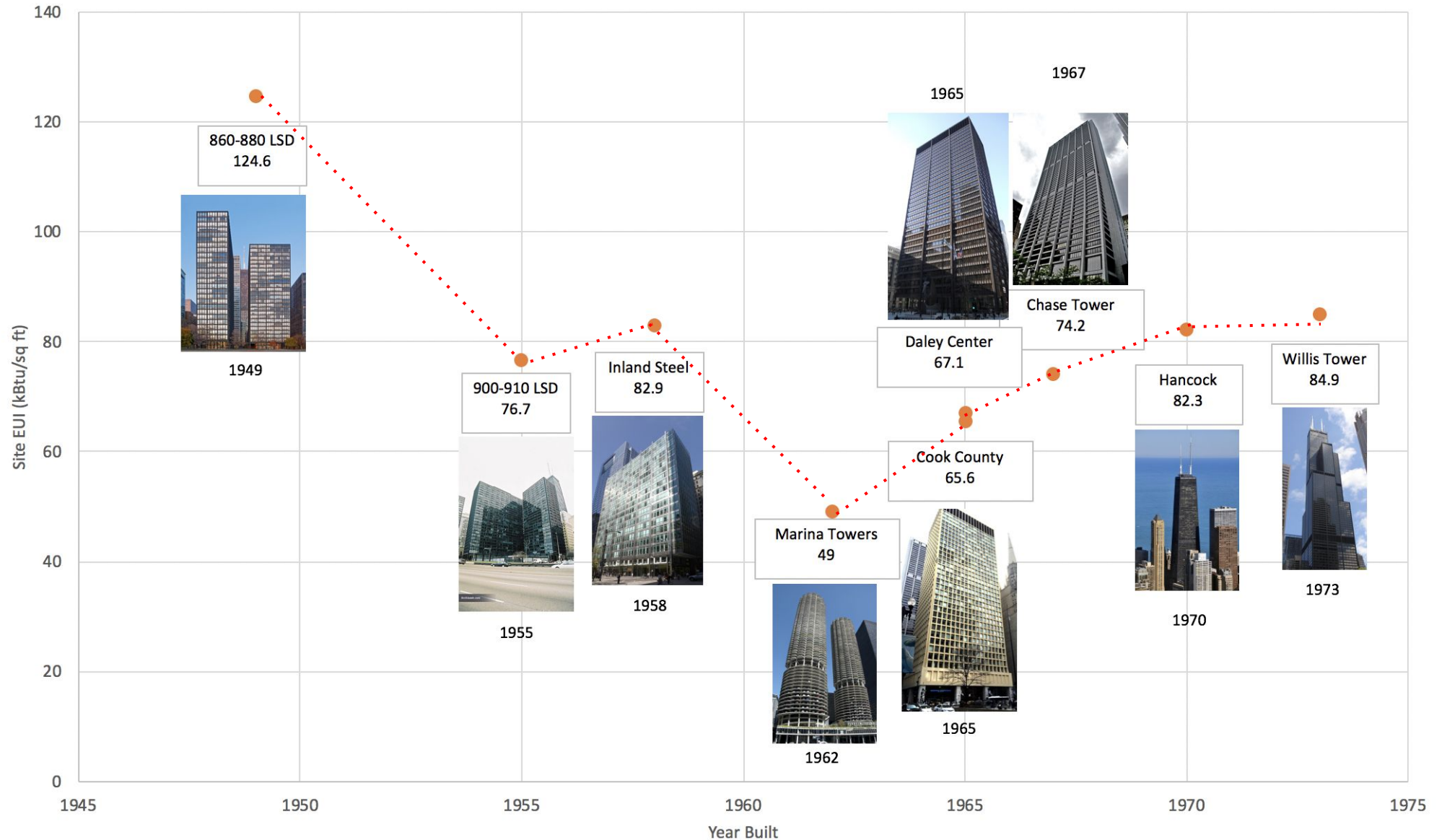
# Learning from Chicago's Benchmarking Data

## EUI's for the First Chicago School of Architecture, 1880- 1915



# Learning from Chicago's Benchmarking Data

## EUI's for the Second Chicago School of Architecture, 1945 - 1975



# Architects Stage an **ENERGY REVOLUTION**

## Introducing a Third Chicago School of Architecture, 2020 Onward

First Chicago School:  
The Skyscraper



Monadnock. EUI = 39

Second Chicago School:  
Glass Box Modernism



Inland Steel. EUI = 82.9

Third Chicago School:  
**A Living Architecture**



Bullitt Center EUI = 20\*

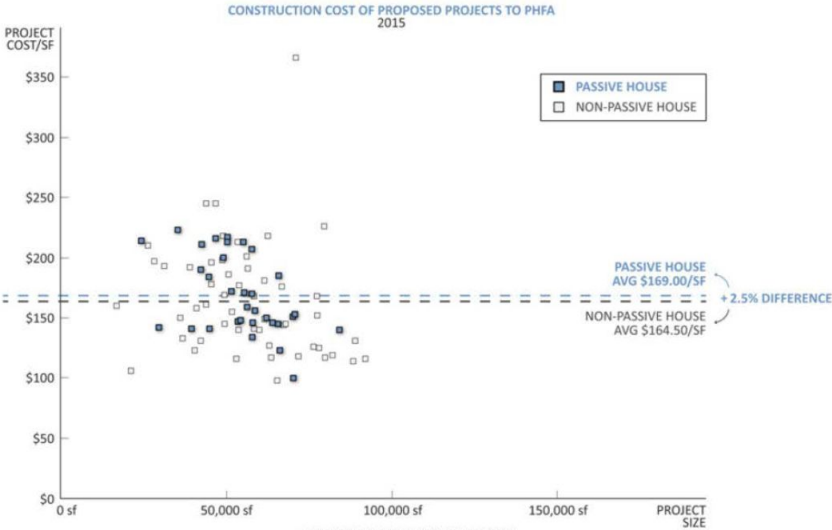
# Pennsylvania shows how Regulation Drives Innovation

Use the LIHTC QAP to drive innovation (Chicago and Illinois)

## Affordable Housing Successes

2015

+ 2.5% on PH

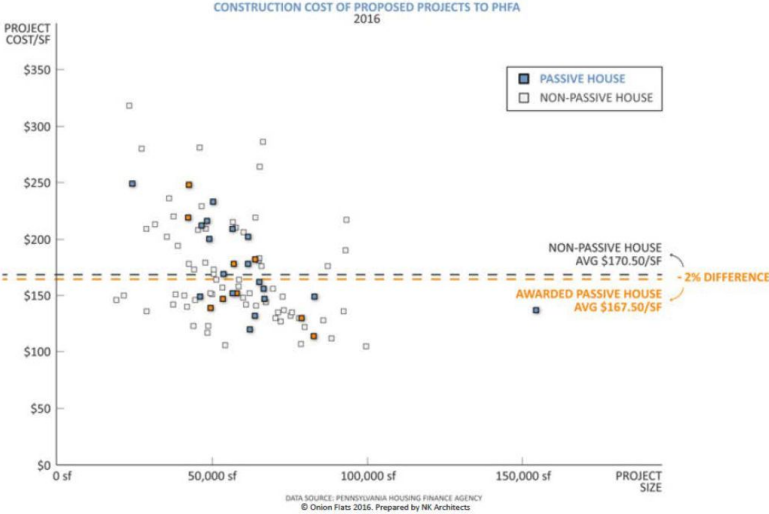


© Passive House Institute US

## Affordable Housing Successes

2016

- 2%!



© Passive House Institute US

# Legislative Decarb Milestones

# What Legislative Milestones are on the path to Decarbonization?

## City of Chicago – Common Agenda

Adopt a Benchmarking Ordinance ●

(9/13)

Declare a Climate Emergency (2/20) ●

Council Resolution: Goal and  
Process

Eliminate Barriers in Zoning/Bldg  
Codes

Ordinance: Net Zero Energy Code

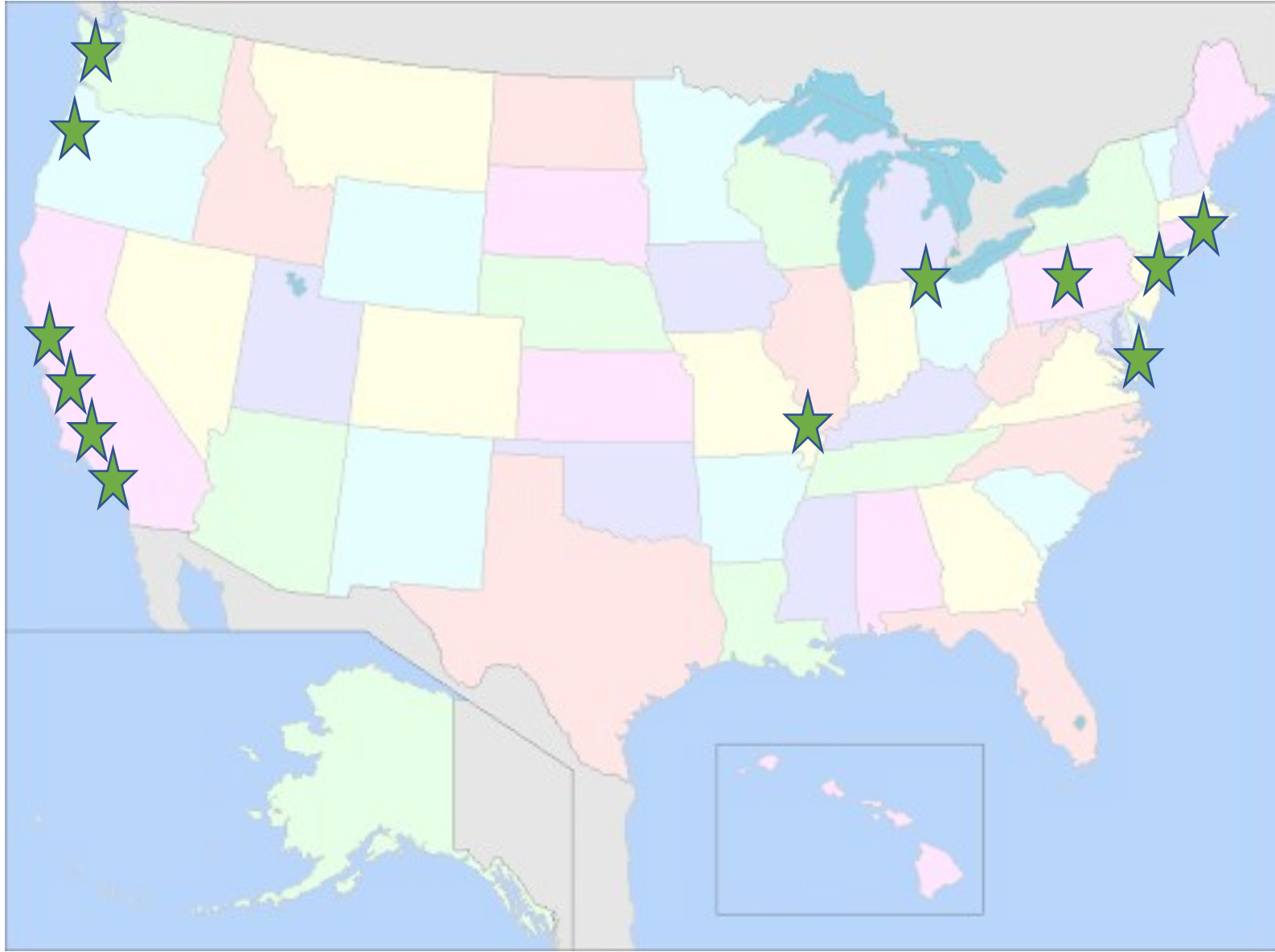
Ordinance: Building Performance  
Standard

Ordinance: All Electric New  
Construction



# Learn from Leading Cities & States Across the Country

Study and debate which approach best fits Chicago





# Learn from California

## Statewide Stretch Code



# Learn from New York

## Adopt a Building Performance Standard

**LOCAL LAW 97  
OF 2019**

**BEGINNING 2024**

**GET YOUR  
BUILDING IN  
COMPLIANCE**



# Learn from Berkeley

## Ban Gas Connections in New Housing

LOCAL // BAY AREA & STATE

### Berkeley becomes first U.S. city to ban natural gas in new homes



Sarah Ravani

July 21, 2019

Updated: July 21, 2019 5:38 p.m.

Strategy: In advance of the ordinance they compiled case studies of built projects that demonstrated the code's viability.



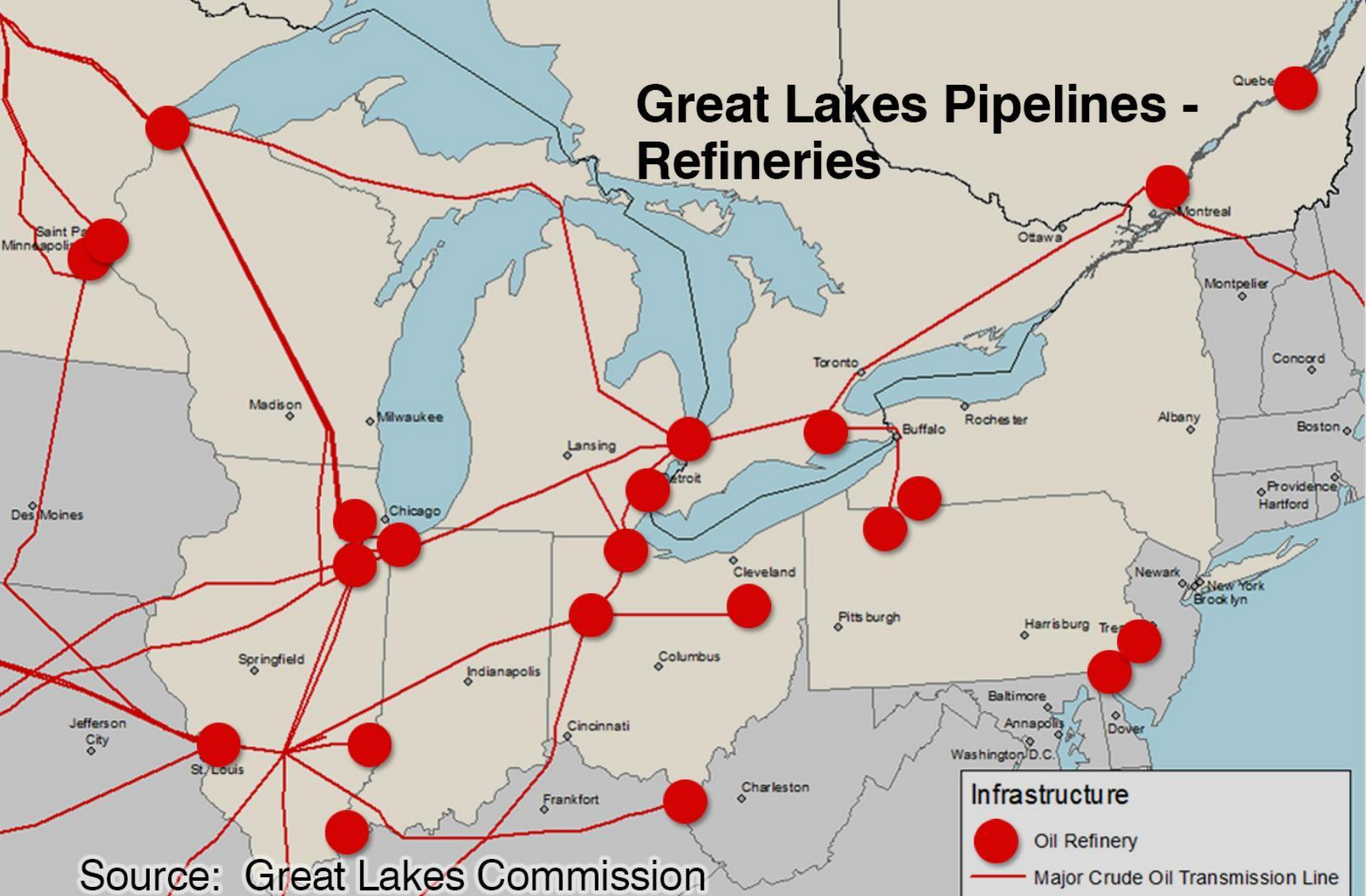
TOC STEP TWO:

An Equitable/Prompt Transition.



Imagine the rate of childhood asthma going down by as much as 42%.

# Ending Refineries is *Righteous* Environmental



MAP  
DETAIL

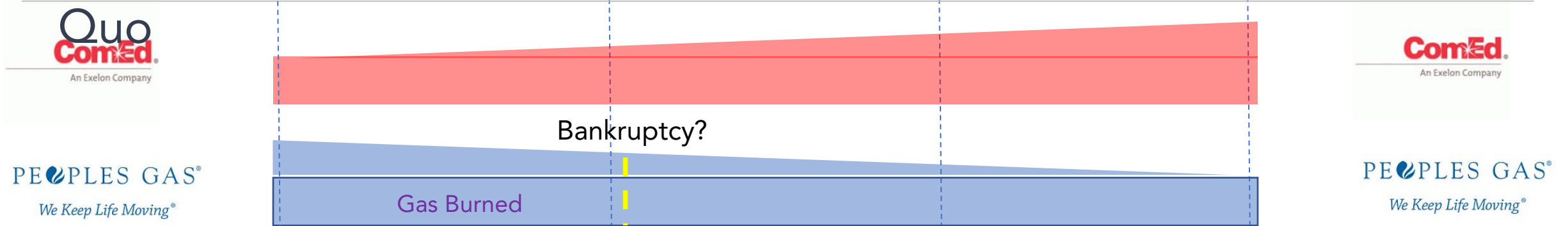
# A separate gas utility is a barrier to equitable



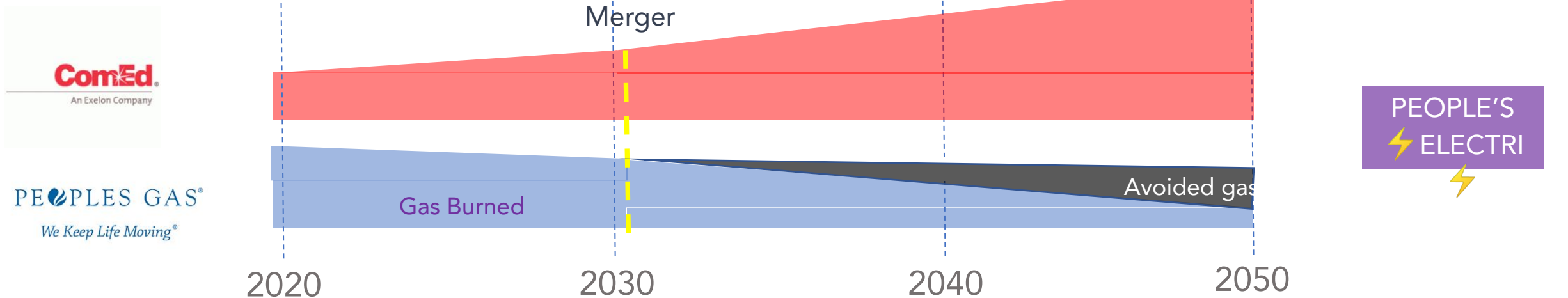
A massive project to replace all of the natural gas pipes that run beneath the city of Chicago could leave hundreds of thousands of Peoples Gas customers paying 10 times what they do now by the time the work is finished in 2040, a new analysis finds.

# Two scenarios for Chicago's utilities?

## Status



## Merger





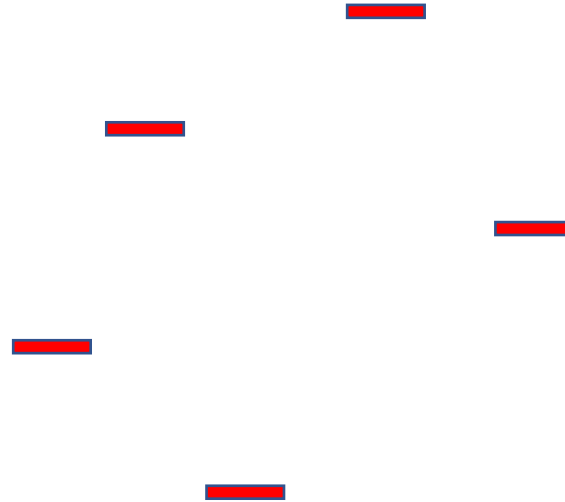
TOC STEP THREE:

Critical Path to Decarbonization



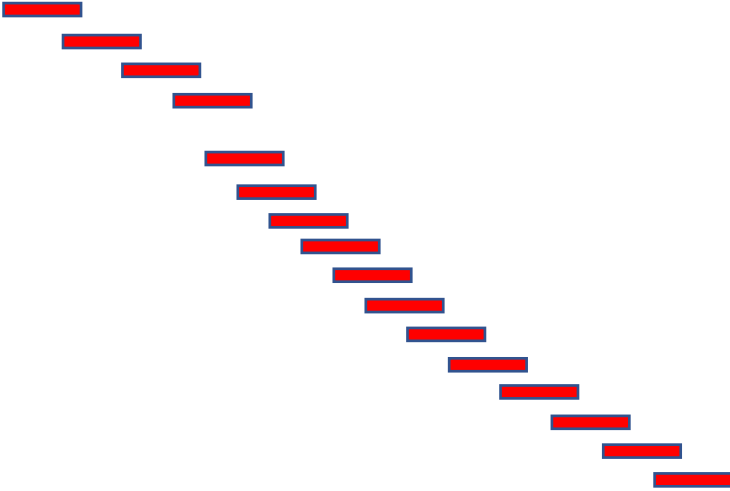
# This is How Chicago and Illinois are

Activity Name	Start	Finish
<b>0</b>	<b>06-Jun-16</b>	<b>15-May-18</b>
Concept Design & Schematic Design	06-Jun-16*	12-Aug-16
Design Development	15-Aug-16	07-Oct-16
Construction Documents - 50% Design	10-Oct-16	08-Nov-16
Issue Site / Civil / Fdns. / Structure Permit Set		08-Nov-16
Bid & Award Foundations & Structure	09-Nov-16	28-Dec-16
Obtain Site / Civil / Fdns. / Structure Permit	09-Nov-16	14-Feb-17
Procure Building Fdn. & Structure Materials	29-Dec-16	18-May-17
Install Site Fence & Erosion Control	15-Feb-17	21-Feb-17
Mobilization	15-Feb-17	28-Feb-17
Site Prep	22-Feb-17	14-Mar-17
Foundations, Grade Beams & Walls	01-Mar-17	06-Jul-17
Underslab Utilities & Slab on Grade	22-Jun-17	03-Aug-17
Building Structure & Slab on Metal Deck	14-Jul-17	22-Sep-17
Building Enclosure & Roofing	25-Aug-17	04-Jan-18
Interior Rough-In	09-Oct-17	01-Mar-18
Drywall & Interior Finishes	06-Dec-17	26-Apr-18
Cleanup, Punchlist, Sys. Startup & Comm.	14-Mar-18	15-May-18
Substantial Completion		15-May-18
<b>1</b>	<b>06-Jun-16</b>	<b>13-Feb-17</b>
Continuous Pricing & Alternatives Review	06-Jun-16	12-Dec-16
Obtain Final Bids & Finalize Project Cost	13-Dec-16	13-Feb-17
Project Cost Finalized		13-Feb-17
<b>3</b>	<b>20-Dec-17</b>	<b>10-May-18</b>
Site Work - Final Grade & Hardscapes	20-Dec-17	15-Mar-18
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Site Finishes & Landscaping	16-Mar-18	10-May-18



# Carbon Free Chicago Believes We Need a Plan

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# Prepare a Decarbonization Plan Like Boston

## Model an All-Electric Future, Then Act to Shave Grid Peak (3X)



CITY of BOSTON

Mayor Martin J. Walsh

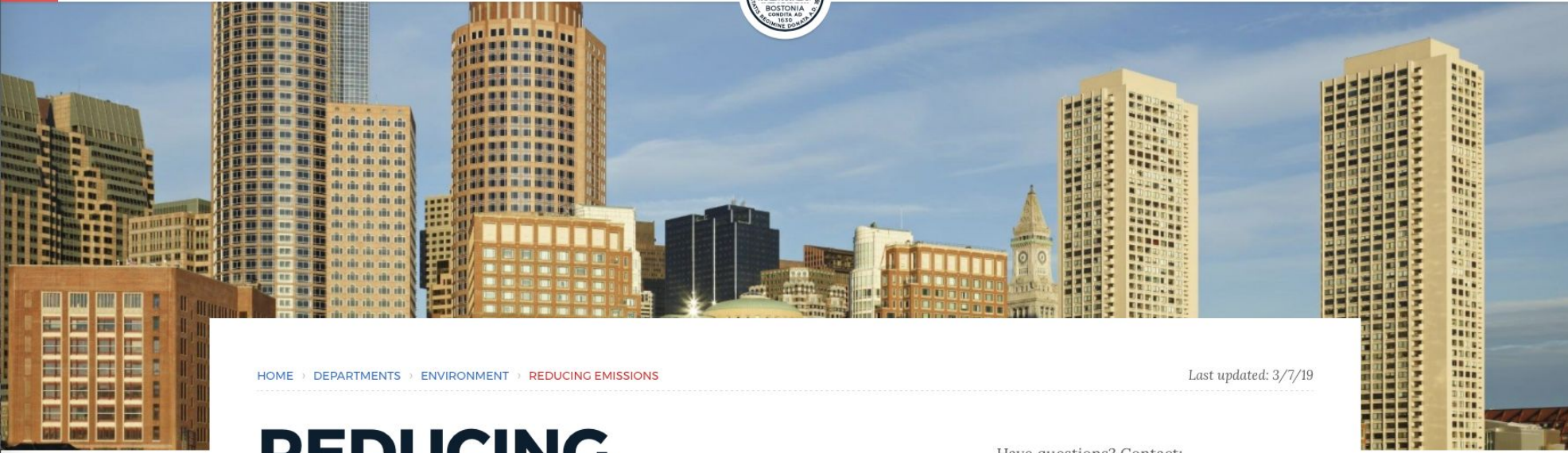


[PAY AND APPLY](#)

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[TRANSLATE](#)



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Last updated: 3/7/19

## REDUCING EMISSIONS

*Carbon Free Boston is our initiative to become carbon neutral by 2050 by significantly reducing greenhouse gas emissions that contribute to climate change.*

Have questions? Contact:

[ENVIRONMENT](#)

617-635-3850

[KATHERINE.ESHEL@BOSTON.GOV](mailto:KATHERINE.ESHEL@BOSTON.GOV)

[PROGRAMS](#) [GO BOSTON 2030](#) [AIR POLLUTION CONTROL COMMISSION](#) [CLIMATE ACTION PLAN UPDATE](#)

[CARBON FREE BOSTON REPORT](#) [PROGRESS](#) [NEWS](#) [TEAM](#)

# Prepare a 10-year Decarb Plan Like Ann Arbor

## Declare a Climate Emergency and Act Like It

Staff had 100 days to make a plan

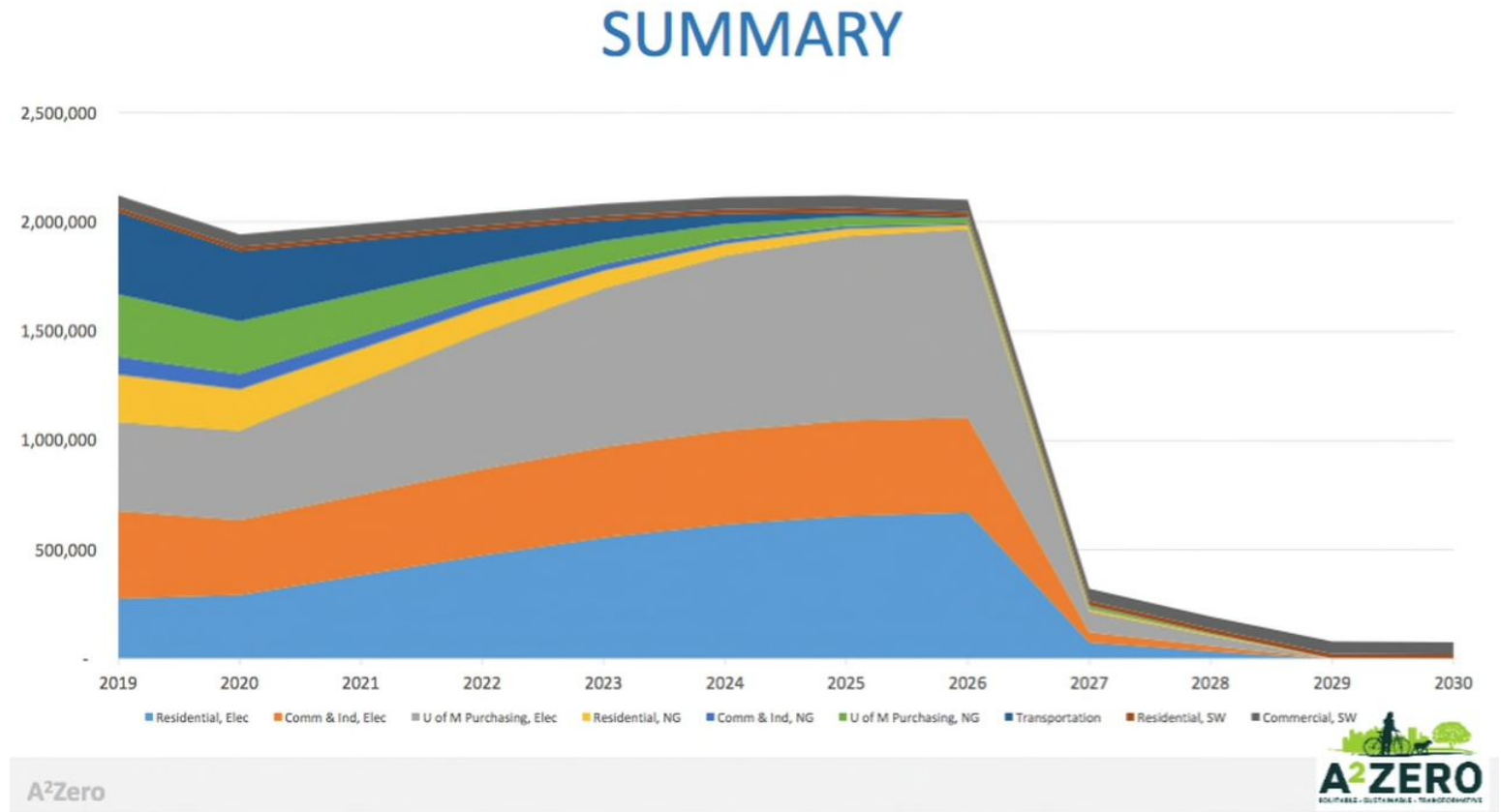
City Population  
121,890

Cost of plan:  
\$1,000,000,000

Cost per capita/10 years:  
\$8,204

Years to implement: 10

Cost per capita/year:  
\$824





Chicago buildings account for 53% of the City's Carbon Emissions.

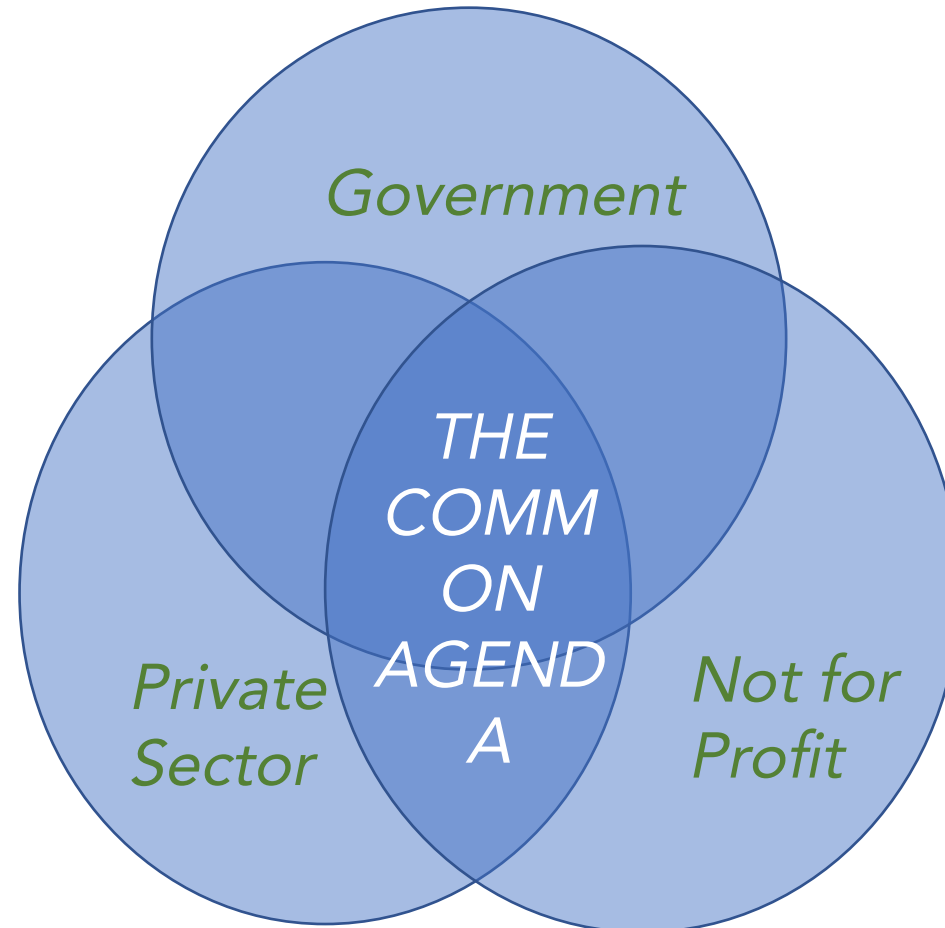
# THE COMMON AGENDA

Part 1: Buildings



# THE COMMON AGENDA

How pursuing a shared goal can spur innovation and speed adoption.



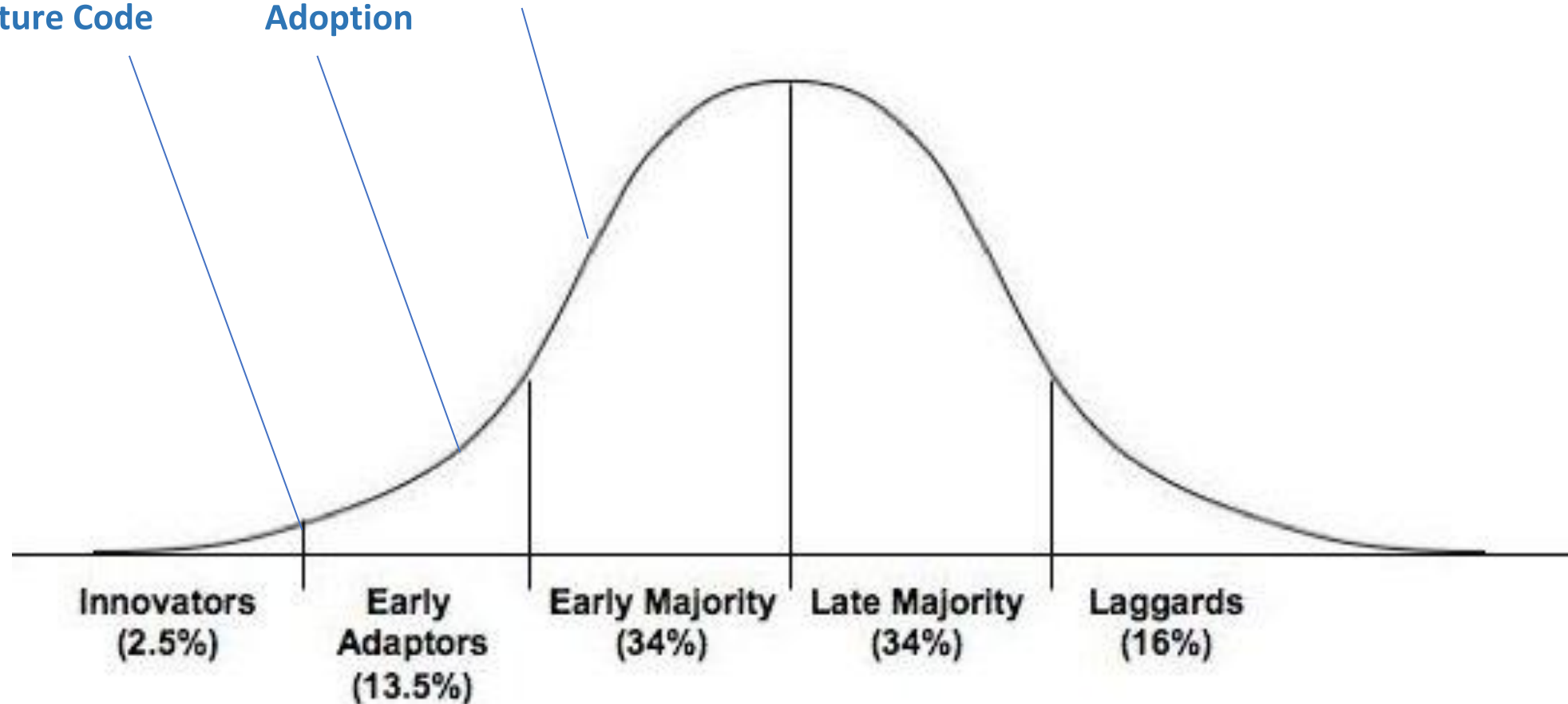
# Innovation Diffusion Curve

What % of the market needs to know how to meet a new code?

Signal Intention to adopt Future Code

Code Adoption

Effective Date



# THE COMMON AGENDA

Adopt a Benchmarking Ordinance ●

(9/13)

Declare a Climate Emergency (2/20) ●



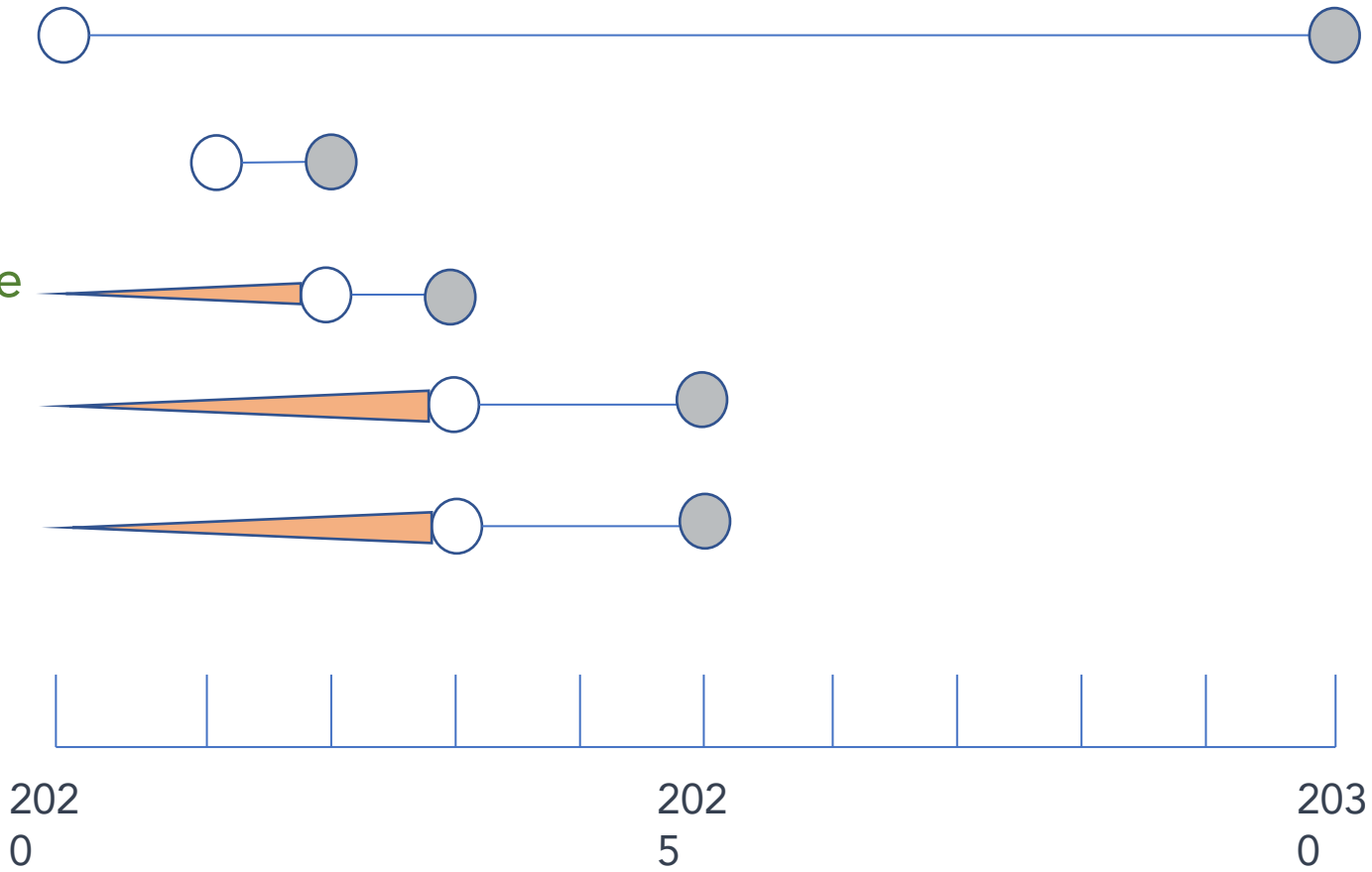
Council Resolution: Goal and Process

Eliminate Barriers in Zoning/Bldg Codes

Ordinance: Net Zero Energy Code

Ordinance: Building Performance Standard

Ordinance: All Electric New Construction



	Compile Local Case Studies
	Proposed Code Adoption
	Proposed Effective Date

# THE COMMON AGENDA

## Acting Like Climate is a Real Emergency

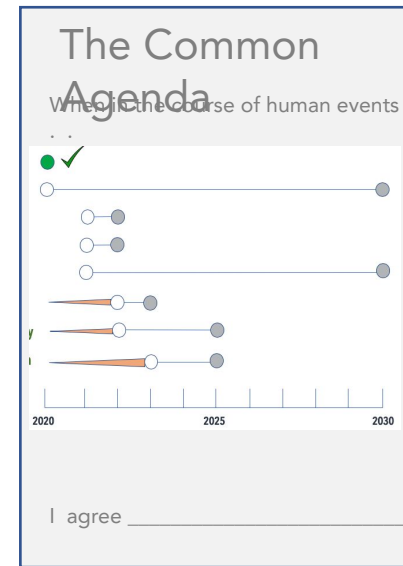
*Draft  
1.0*

*Draft  
2.0*

*City  
Council  
Decarb  
Resolution*

*Line up  
Signatories*

*Chicago  
Climate  
Commission*



# The Adoption Campaign Strategy

## Stealing from the Benchmarking Ordinance



### ENERGY-EFFICIENCY BENCHMARKING AND DISCLOSURE: HARNESSING MARKET FORCES TO SAVE ENERGY AND DRIVE INVESTMENT IN CHICAGO BUILDINGS

#### OUR GOALS:

1. **Save Money**—Lower operational energy costs for Chicago building owners and tenants.
2. **Create Local Jobs**—Support growth of the energy-efficiency industry in Chicago.
3. **Protect Our Health**—Reduce harmful pollution by using less energy.
4. **Lead the Nation**—Promote Chicago's position as a leading sustainable city to attract new businesses and succeed in the global marketplace.

#### THE OPPORTUNITY:

Less than one percent of Chicago's buildings are larger than 50,000 square feet, but these big buildings represent 22 percent of all energy use in our built environment and provide enormous potential for saving money, creating jobs, and reducing pollution through cost-effective energy-efficiency improvements. Unleashing this potential could be worth billions of dollars for Chicago, but we need consistent and accurate building energy data in order to take action. And having information on buildings' energy use would benefit many groups:

- Building owners and managers can use the data to make informed decisions on how to improve energy use in their buildings.
- Prospective building tenants can make leasing decisions based on a full understanding of their potential energy costs and environmental impact.
- High-quality and consistent data on building performance allows energy-efficiency programs to target rebates and incentives to buildings where there is the most potential for savings.

#### THE SOLUTION:

##### PROVIDE THE MARKETPLACE WITH CURRENT, ACCURATE INFORMATION ABOUT BUILDING ENERGY PERFORMANCE SIMPLY AND EFFECTIVELY

The marketplace needs solid, accurate information about how buildings are performing, derived from tools applied consistently across all major buildings. For this reason, Mayor Emanuel's Sustainable Chicago 2015 Action Agenda recognizes building energy transparency policies as a key priority for the city.

- **WHAT: Benchmarking and Disclosure Ordinance**—This kind of ordinance requires (1) that large commercial and residential buildings use a "benchmarking" tool called **ENERGY STAR Portfolio Manager** to assess how energy efficient the buildings are compared to similar buildings; and (2) that critical information derived from the benchmarking efforts is **disclosed publicly to drive greater awareness of building efficiency in the marketplace**. New York, San Francisco, Minneapolis, Philadelphia, Seattle, and Washington, D.C. are among the cities that have already adopted such requirements.
- **HOW: Compliance Is Easy and Beneficial**—The ENERGY STAR Portfolio Manager tool is **simple to use**, is **free of charge**, and provides **standardized and easily understood data** by which building performance can be compared. Chicago professionals are knowledgeable in Portfolio Manager and are ready to take action.
- **WHY: Knowledge Is Power**—There is strong evidence that ENERGY STAR Portfolio Manager helps drive energy-efficiency improvements. Specifically, for the 35,000 buildings that used the tool to benchmark energy performance from 2008 to 2011, **average energy use declined by an impressive 7 percent**.
- **WHY NOW: Saves Money While Growing the Economy and Protecting Our Community**—Buildings often discover that they can cut energy use by 20 to 30 percent with very short payback periods. Across the 3,500 buildings that would be subject to the ordinance, this level of energy savings means **big money and a big impact to our economy, environment, and public health**.

#### SUPPORTERS INCLUDE:

ENGINEERING AND ENERGY SERVICES	REAL ESTATE INDUSTRY	LABOR INTERESTS	PUBLIC INTEREST COMMUNITY

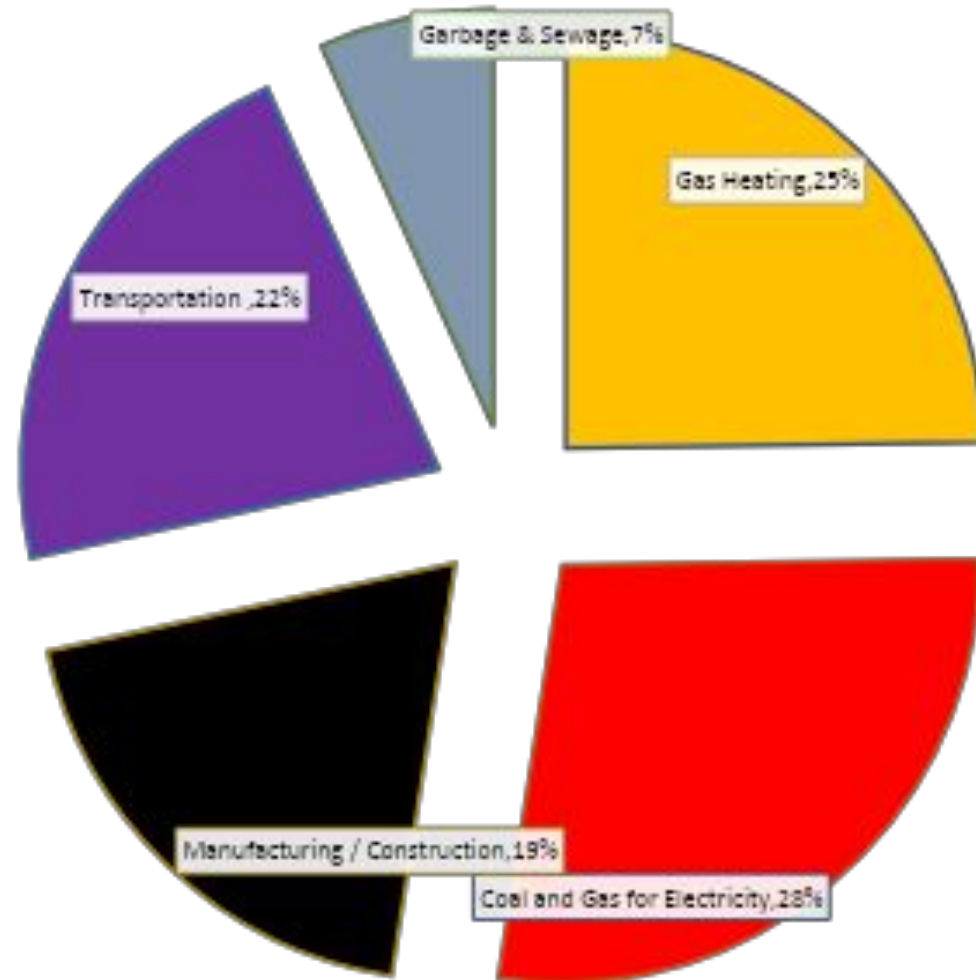
To make a Carbon-Free Chicago a reality  
take your Personal Pledge now.

**By sunrise on Earth Day 2030 I will no longer  
burn fossil fuels to power or heat my home,  
work, or vehicles.**

Thank You

# Our fossil fuel use goes way beyond our dirty grid.

Chicago Climate change Pollution sources



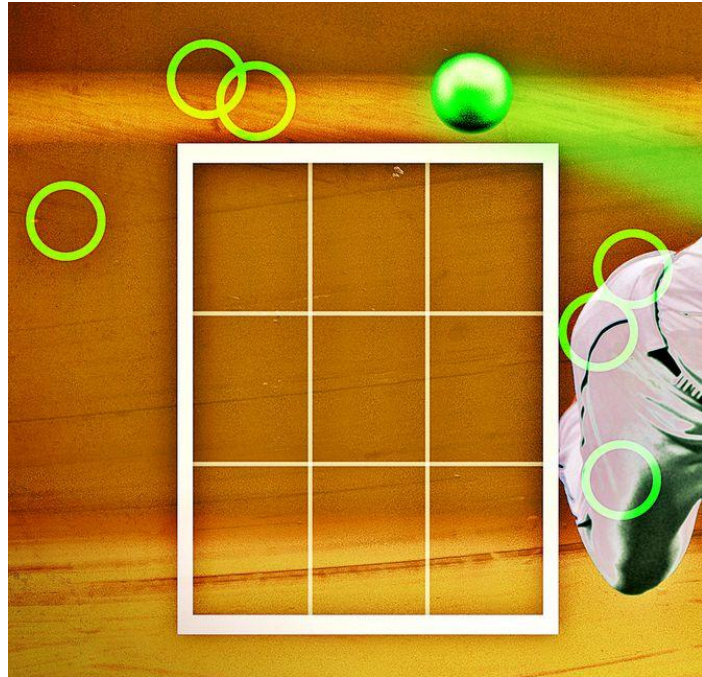
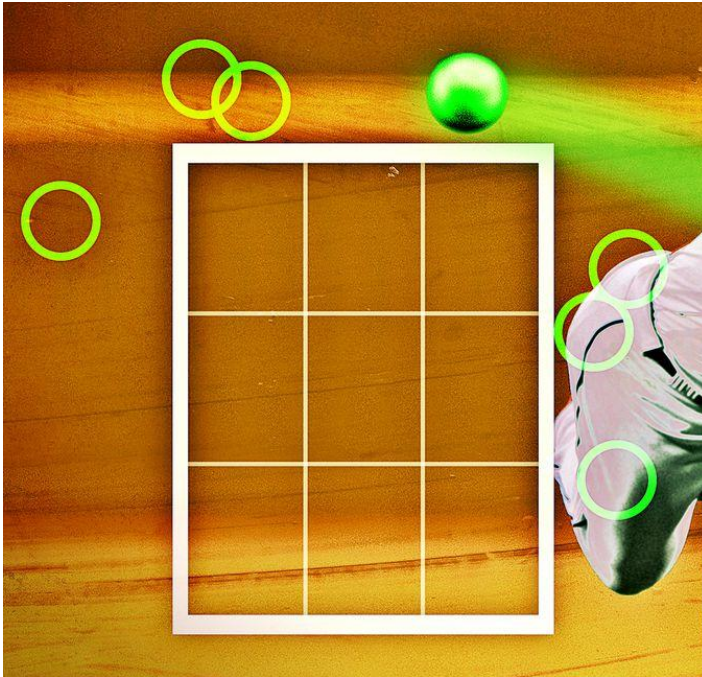
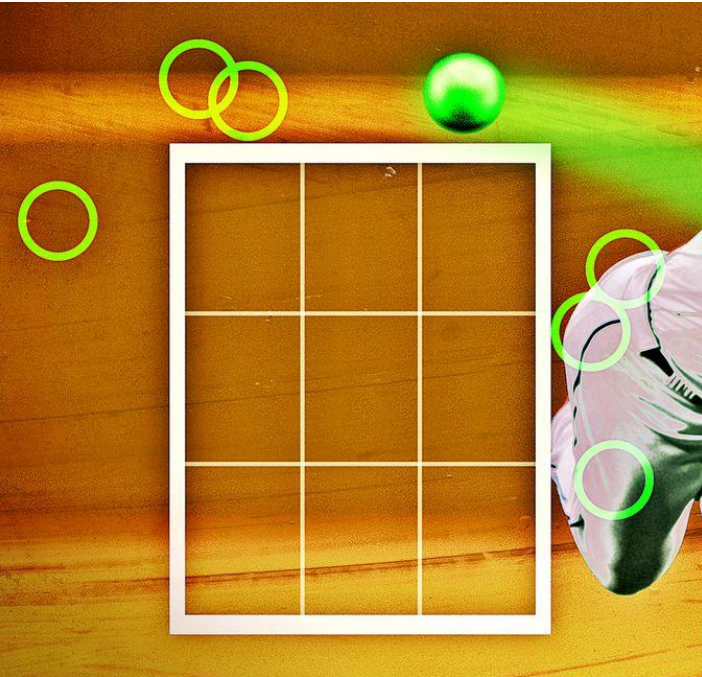


# *The Architect's Case Study Strike*

*Building  
Performance  
Standard*

*Zone  
PHIUS/  
Net-Zero-Ready  
Code*

*All-Electric  
Buildings  
/Gas Ban*



# Habitat for Humanity SF Prototype

## Reform the Zoning Code



### HABITAT FOR HUMANITY CHICAGO SINGLE FAMILY PROTOTYPE

THE PATH TO **CARBON-FREE** HOUSING . A CASE STUDY



Habitat for  
Humanity  
Farr Associates

# Tierra Linda

## Reform the Building Code

*Developer:*  
*LUCHA*  
*LBB Architects*



# Lincoln Park Residence

Reform the Zoning Code



*Private Residence,  
Farr Associates*

