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The City Energy Project
Course Number: CXENERGY1520

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April 29, 2015



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NATURAL RESOURCES DEFENSE COUNCIL



Course Description

Attend this session and learn about The City Energy Project, a national initiative to create healthier and more prosperous American cities by improving the energy efficiency of buildings. Working in partnership, the Project and participating cities support innovative and practical solutions that reduce pollution, boost local economies, and create healthier environments. The pioneering actions of the 10 leading cities involved in the City Energy Project—Atlanta, Boston, Chicago, Denver, Houston, Kansas City Mo., Los Angeles, Orlando, Philadelphia, Salt Lake City—will help shape and define next-generation energy efficiency efforts in communities nationwide.

Learning Objectives

At the end of the this course, participants will be able to:

1. Learn about The City Energy Project, a national initiative to create healthier and more prosperous American cities by improving the energy efficiency of buildings.
2. Understand how municipalities are implementing innovative and practical solutions that reduce pollution, boost local economies, and create healthier environments.
3. Learn about programs created in the 10 leading cities involved in the City Energy Project—Atlanta, Boston, Chicago, Denver, Houston, Kansas City Mo., Los Angeles, Orlando, Philadelphia, Salt Lake City.
4. Learn how to leverage the knowledge and information gained from The City Energy Project in your locality.



Improving the energy efficiency of existing buildings in 10 major U.S. cities

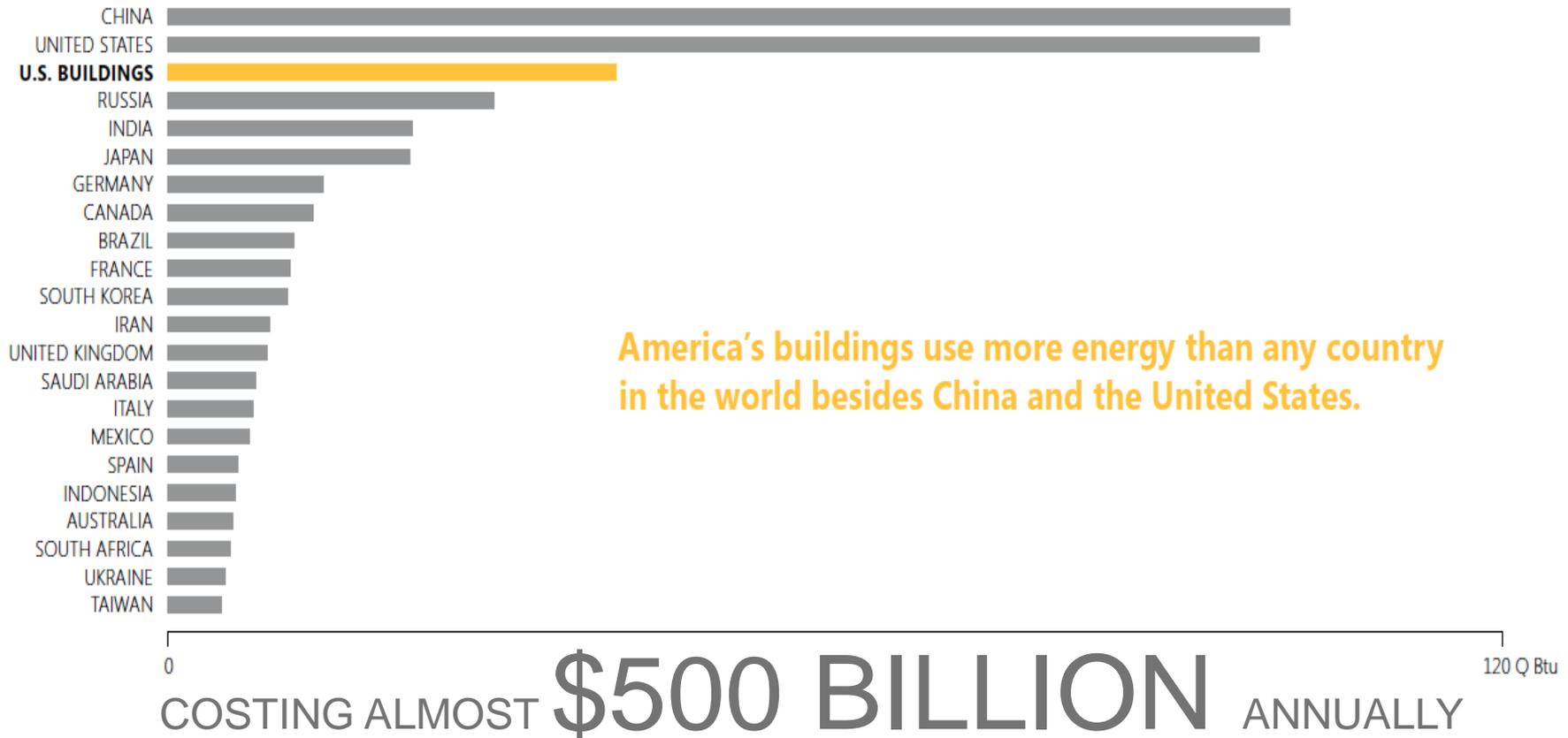
April 29, 2015 | CxEnergy 2015

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THE PROBLEM

Comparison of Energy Use of U.S. Building Sector and Largest Energy-Consuming Nations

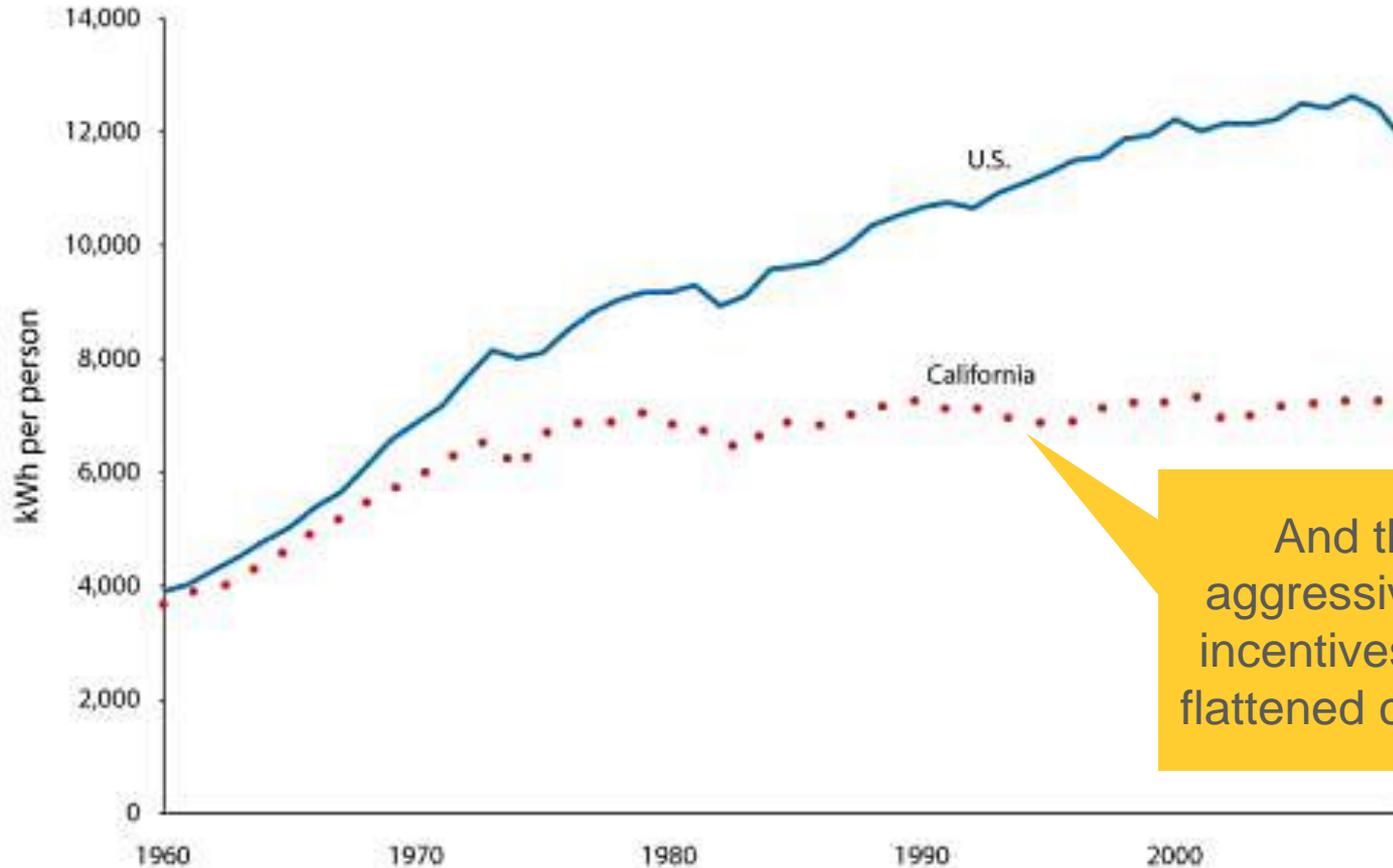
2010 Primary Energy Use (Quadrillion Btu)



America's buildings use more energy than any country in the world besides China and the United States.

EVEN WITH IMPROVED CODES, ENERGY CONSUMPTION HAS INCREASED

Total per-capita electricity use, 1960–2009



Rocky Mountain Institute © 2011. For more information see www.RMI.org/RenewwritingFire.

THE SOLUTION: Energy Efficiency in Existing Buildings



ENTER: THE CITY ENERGY PROJECT

Funders

Bloomberg
Philanthropies

THE
KRESGE
FOUNDATION

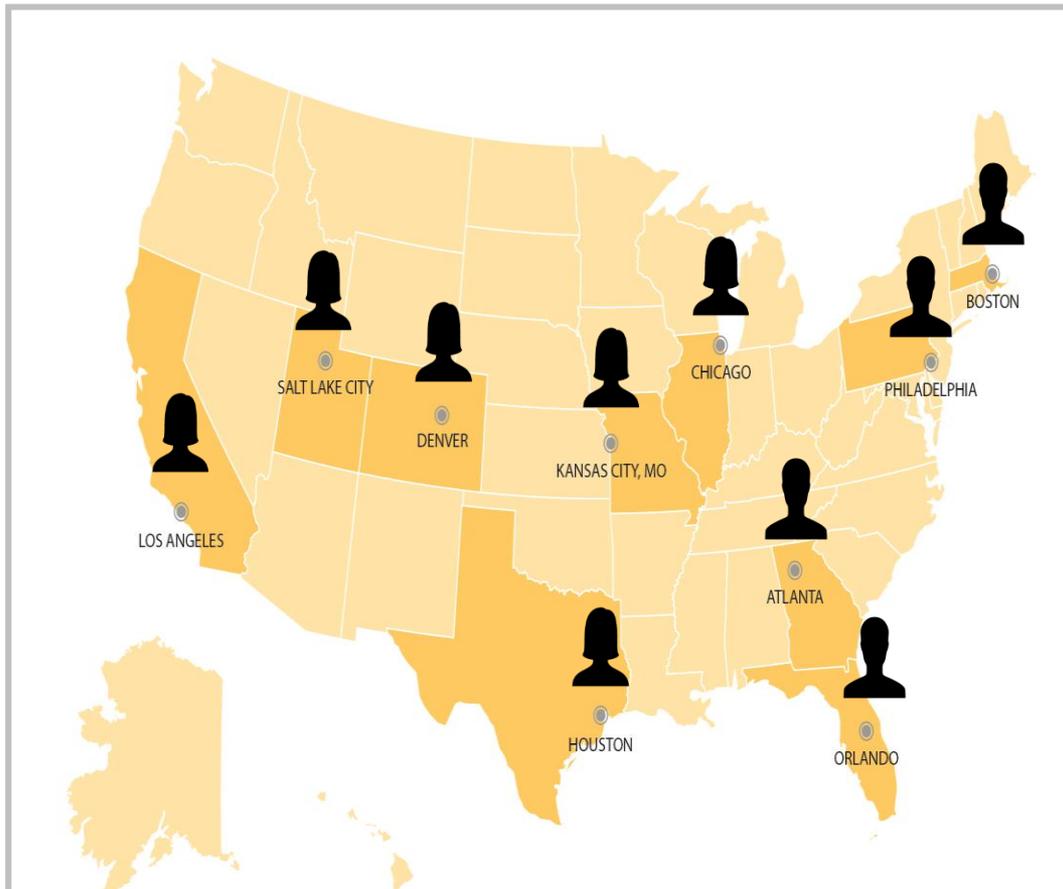
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DORIS DUKE
CHARITABLE FOUNDATION

Directors



10 Cities



An ambitious national initiative to improve the energy efficiency of existing buildings in 10 major American cities

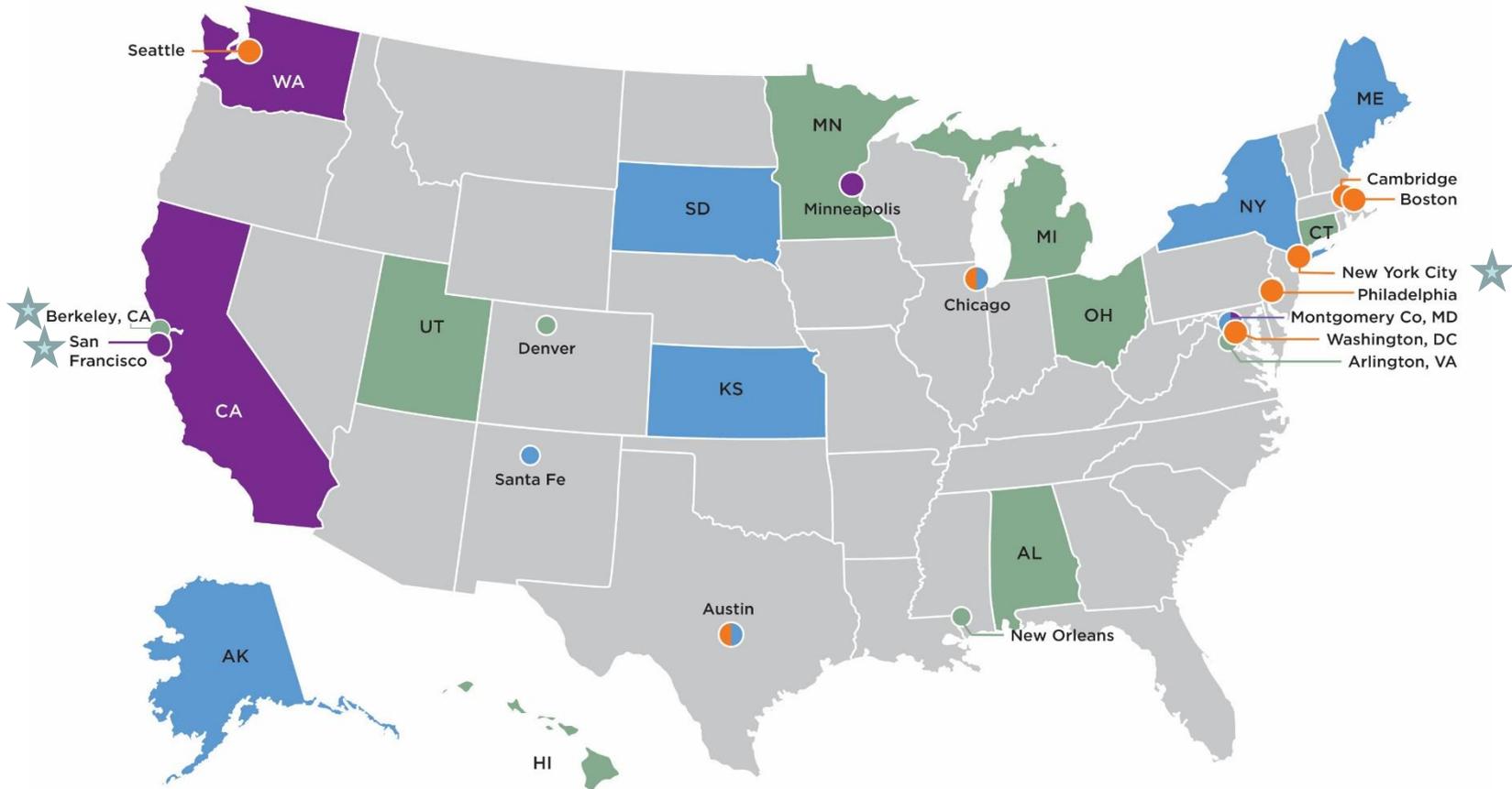
Five-Part Theory of Change

1

America's
Cities Will
Lead

IN FACT, MANY HAVE ALREADY STARTED

U.S. Building Benchmarking and Transparency Policies



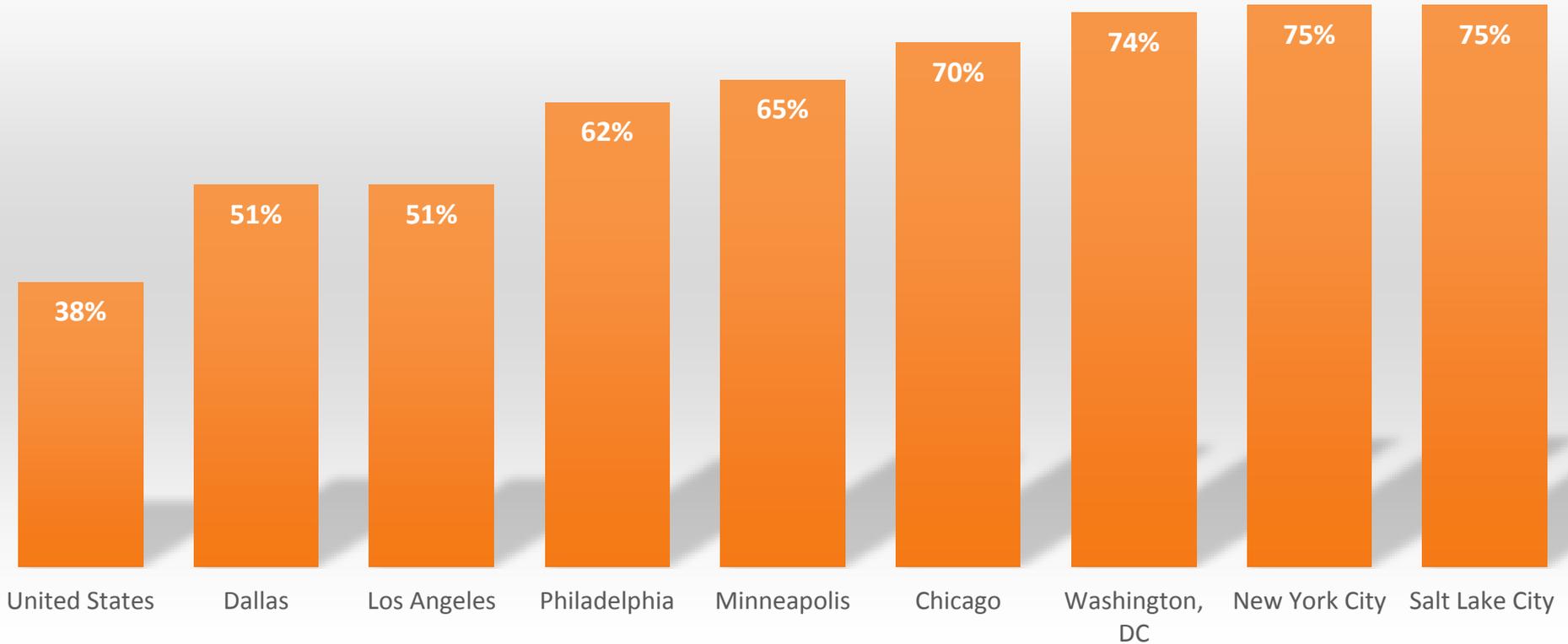
- Commercial policy adopted
- Commercial & multifamily policy adopted
- Public buildings benchmarked
- Single-family transparency adopted

★ Energy Audits and/or Retro-commissioning Required

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CITIES ARE LEADING WITH THEIR BUILDING STOCK

Percentage of Carbon Emissions from the Building Sector



AND THEY
HAVE
LOCAL
CONTROL
TO TAKE
ACTION

10 mayors of large American cities
have committed to making their cities stronger
and healthier through the City Energy Project:
Better buildings for better cities.

Atlanta

Mayor
Kasim Reed



**Kansas
City, MO**

Mayor
Sly James

Boston

Mayor
Martin J.
Walsh



**Los
Angeles**

Mayor
Eric Garcetti

Chicago

Mayor
Rahm
Emanuel



Orlando

Mayor
Buddy Dyer

Denver

Mayor
Michael B.
Hancock



Philadelphia

Mayor
Michael A.
Nutter

Houston

Mayor
Annise
Parker



**Salt Lake
City**

Mayor
Ralph
Becker

2

Focus on Large
Existing Buildings

THE OPPORTUNITY: THE LARGEST EXISTING BUILDINGS



BY 2030, ROUGHLY **80%**
OF THE BUILDINGS IN OUR
CITIES WILL BE BUILDINGS
WE ALREADY HAVE TODAY



JUST **2% TO 5%**
OF THE BUILDINGS IN CITIES
ACCOUNT FOR ROUGHLY
HALF THE SQUARE FOOTAGE

PRELIMINARY ANALYSIS FOR LOS ANGELES

Built Square Feet	Cumulative % BTUs	Cumulative % Parcels
All	100.00%	100.0%
> 5k	59.60%	9.9%
> 10k	51.90%	4.4%
> 15k	47.70%	3.0%
> 20k	44.60%	2.2%
> 25k	41.80%	1.7%
> 30k	39.80%	1.4%
> 35k	37.70%	1.2%
> 40k	36.20%	1.0%
> 45k	34.80%	0.9%
> 50k	33.80%	0.8%

*Analysis by UCLA, numbers subject to change

3

Overcome
the Barriers

POLICIES AND PROGRAMS ARE DESIGNED TO OVERCOME THE BARRIERS TO ENERGY EFFICIENCY

Information Gap

- Lack of understanding around building energy and water consumption
- Difficult to access whole building energy data

Energy benchmarking & disclosure, audits, tenant sub-metering

Financial Barriers

- Inability for utilities to spend of all of their energy efficiency incentives
- Slow uptake of private financing

Provide financing;
Align lease structures

Inertia

- Most building owners have not made efforts to improve efficiency
- Long standing focus on new construction and not existing buildings

Require improved operation, cost effective upgrades, and code enforcement

Complexity

- Difficulty navigating various tools, technologies, companies and financing opportunities
- Information on easy action items not readily available

Lead by example by city government & challenge programs

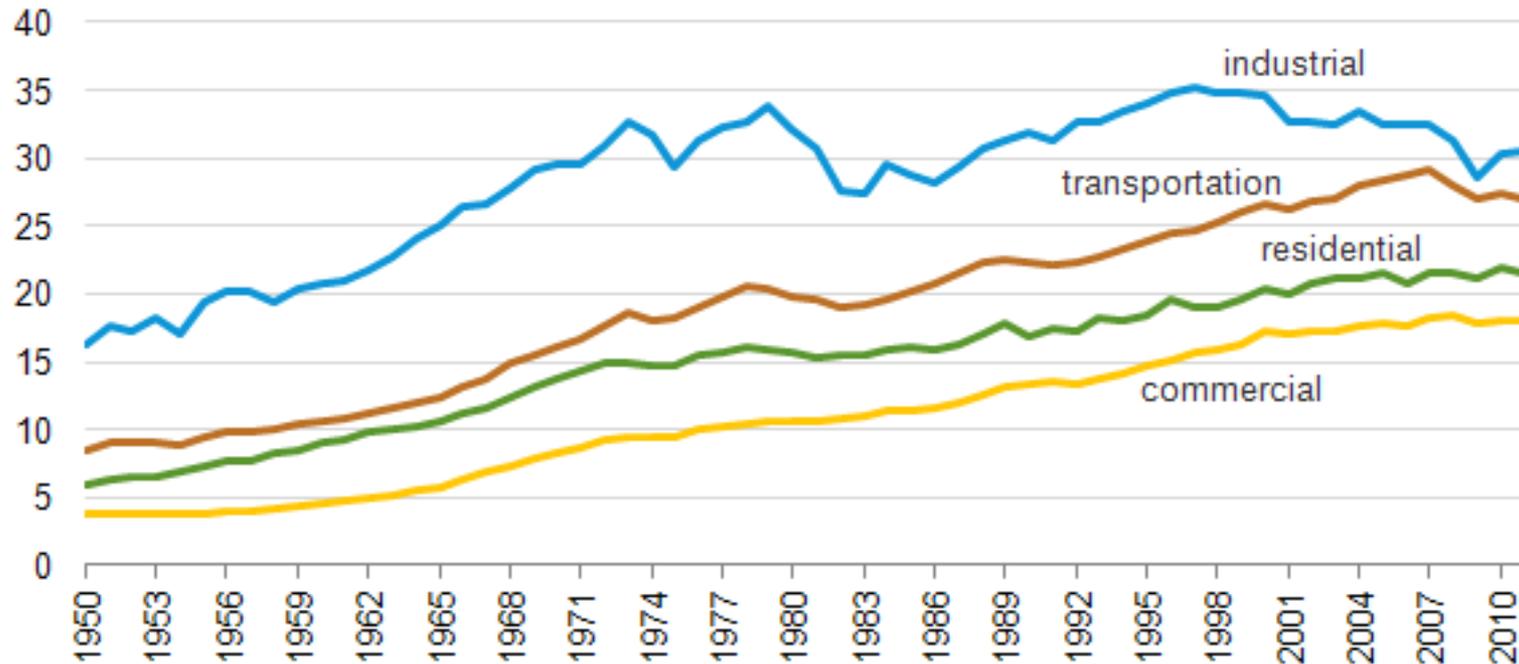
4

Create
Ordinances

VOLUNTARY MEASURES HAVE NOT BEEN EFFECTIVE ENOUGH.

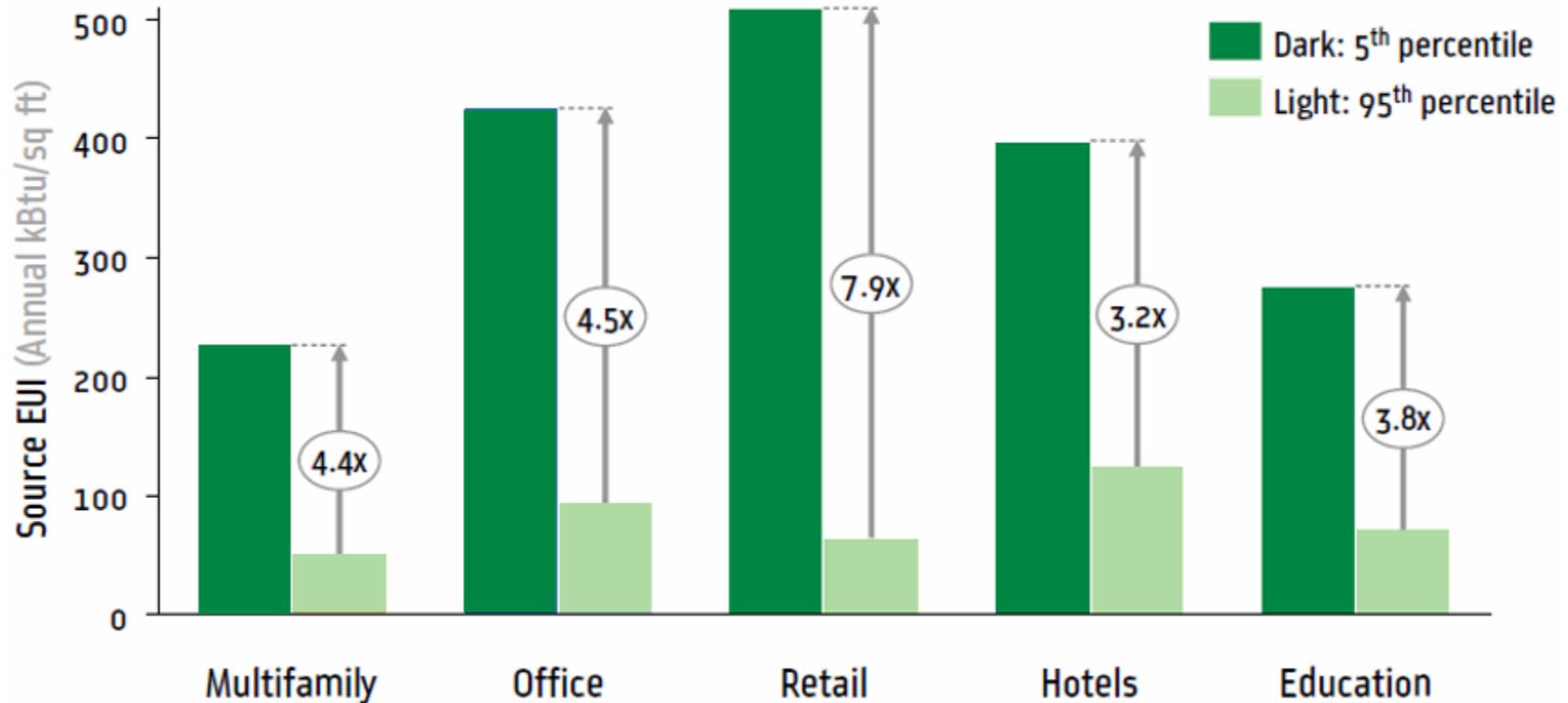
U.S. total energy consumption estimates by end-use sector, 1950-2011

quadrillion Btu



WE WILL NEED MUCH MORE POWERFUL MEASURES TO ACHIEVE THE REDUCTIONS WE NEED BY 2050

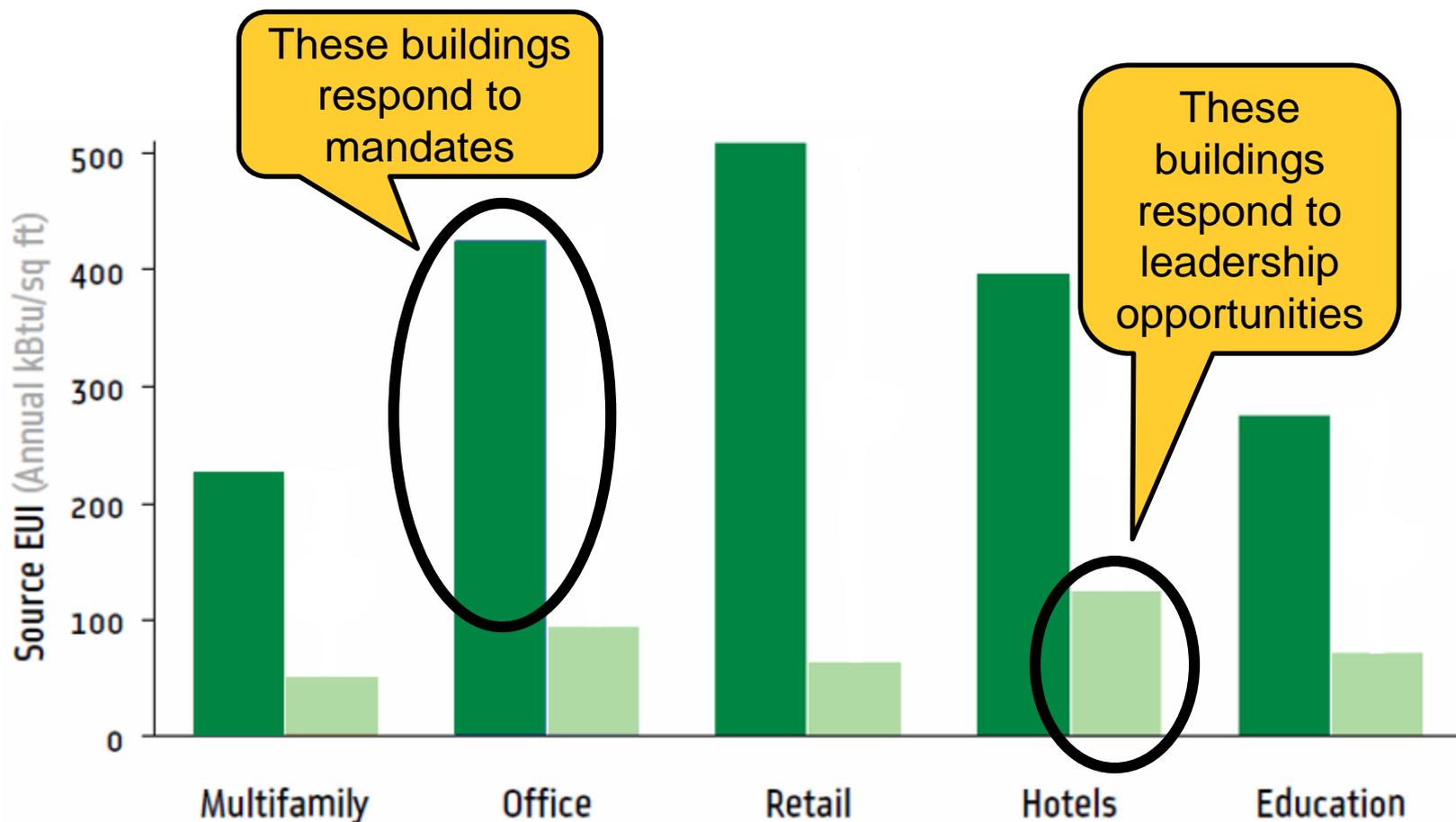
BUILDING INEFFICIENCIES CREATE A ROLE FOR COMMON SENSE REQUIREMENTS



4 TO 8 TIMES MORE ENERGY IS USED BY POOR PERFORMING BUILDINGS

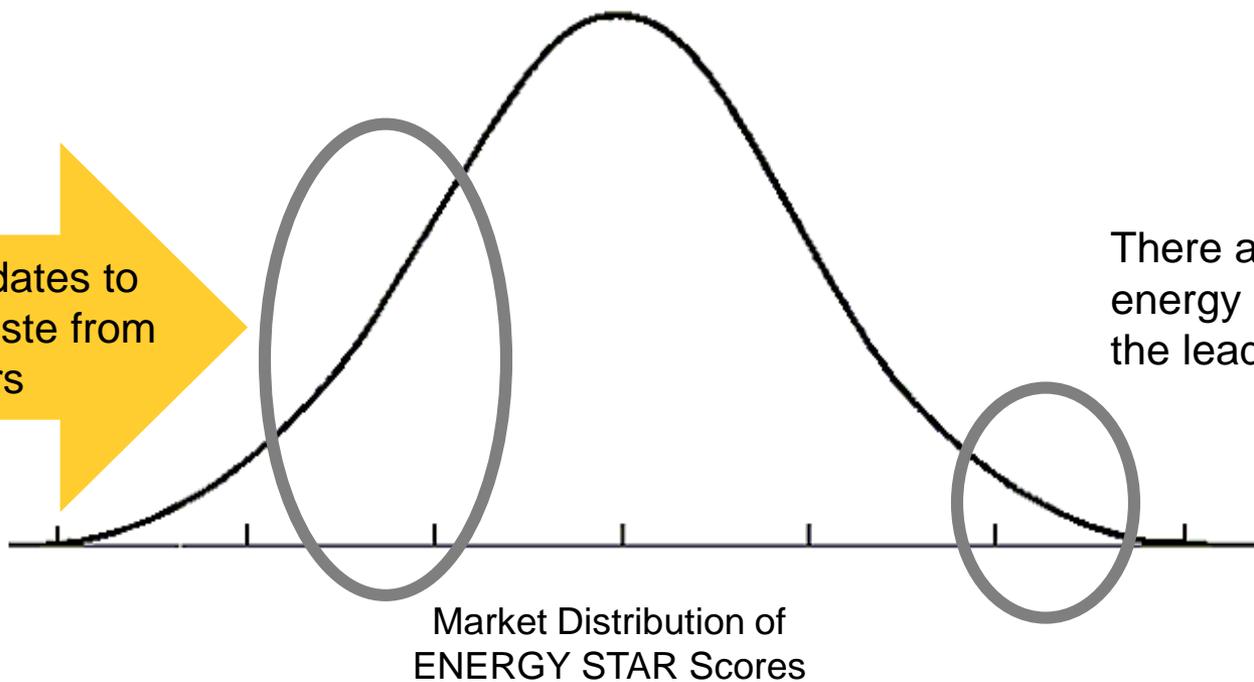
*Based on New York City's benchmarking data

BUILDING OWNERS RESPOND TO DIFFERENT MECHANISMS TO TAKE ACTION



WE CANNOT SOLELY RELY ON LEADERS TO MEET OUR AGGRESSIVE ENERGY REDUCTION GOALS

We need mandates to capture the waste from poor performers



There are diminishing energy savings from the leading edge

5

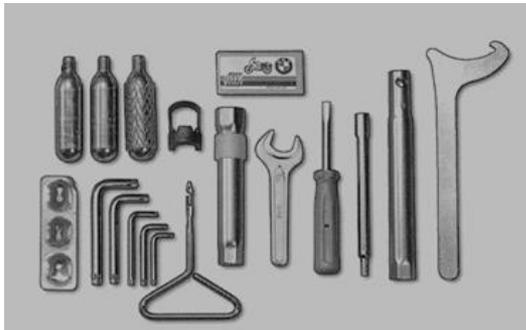
Make it
Easier

PROVIDE RESOURCE TO CITIES



Local Assistance

- Funding for 1 or 2 on-site technical advisers
- Funding to engage local partners
- Funding for analytical consulting services



A Replicable Policy Framework

- A suite of proven policies
- Flexibility to chose and adapt
- Policies supported with resources toolkit and Hub expertise

CITY ENERGY PROJECT HANDBOOK

A JOINT PROJECT OF NRDC + IMT

CEP Hub Assistance

- Hands-on technical expertise and guidance
- Advancement of national level tools and standards
- Facilitation of inter-city collaboration

Existing Policies

COMPARISON OF U.S. BENCHMARKING AND TRANSPARENCY POLICIES

	Legislation				Building Type & Size Threshold			Disclosure				Rating System		Additional Elements			
	Jurisdiction	Short Name	Enacted	First Compliance Deadline	Municipal	Commercial	Multifamily	To Gov't	On Public Website	Time of Transaction	To Current Tenants	Energy Star	Other	Utility Req't	Water Use Tracking	Additional Requirements	
Cities	Austin	Energy Conservation Audit & Disclosure (ECAD) Ordinance	Nov 2008	June 2011	✓	10K SF+	Audits	✓	-	Buyers	-	✓	ACLARA	-	-	Audits & mandatory upgrades for multifamily buildings	
	Berkeley	Building Energy Saving Ordinance	Mar 2015	Oct 2016	25K SF+	25K SF+	25K SF+	✓	✓	Buyers, Lessees	✓	✓	-	-	-	Energy report every 5 years for large buildings, every 8 years for medium and small buildings	
	Boston	Boston Energy Reporting and Disclosure Ordinance	May 2013	May 2014	✓	35K SF+	35+ units or 35K SF+	✓	✓	-	-	✓	-	-	✓	Periodic energy assessments and/or actions	
	Cambridge	Building Energy Use Disclosure Ordinance	July 2014	December 2014	10K SF+	25K SF+	50+ units	✓	✓	-	-	✓	-	-	✓	-	
	Chicago	Chapter 18-14. Building Energy Use Benchmarking Ordinance	Sept 2013	June 2014	50K SF+	50K SF+	50K SF+	✓	✓	-	-	✓	-	-	-	-	Verification of benchmarking data by licensed professional 1 st year, then every 3 years
	District of Columbia	Clean and Affordable Energy Act of 2008	July 2008	April 2013	10K SF+	50K SF+	50K SF+	✓	✓	-	-	✓	Energy Star Target Finder	-	✓	-	
	Minneapolis	Chapter 47.190. Commercial Building Rating and Disclosure Ordinance	Jan 2013	May 2014	25K SF+	50K SF+	-	✓	✓	-	-	✓	-	-	✓	-	
	New York City	Local Law 84 (additional requirements in LL 87, LL 88)	Dec 2009	August 2011	10K SF+	50K SF+	50K SF+	✓	✓	-	-	✓	-	-	✓	-	ASHRAE level II audits & RCx (LL 87), lighting upgrades & submetering (LL 88)
	Philadelphia	§9-3402 of the Philadelphia Code	June 2012	October 2013	50K SF+	50K SF+	-	✓	✓	Buyers, Lessees	-	✓	-	-	✓	-	
	San Francisco	Existing Commercial Buildings Energy Performance Ord.	Feb 2011	October 2011	10K SF+	10K SF+	-	✓	✓	†Buyers, Lessees, Lenders	✓	✓	-	†	-	-	ASHRAE level I or II audits or RCx every 5 years
Seattle	CB 116731	Jan 2010	October 2011	20K SF+	20K SF+	20K SF+	✓	-	†Buyers, Lessees, Lenders	✓	✓	-	✓	-	-		

NEW YORK CITY'S ENERGY AUDIT AND RETRO-COMMISSIONING LAW

**LOCAL LAWS
OF
THE CITY OF NEW YORK
FOR THE YEAR 2009**

No. 87

- 1.4. Loads are distributed equally across equipment when appropriate (i.e. fans, boilers, pumps, etc. that run in parallel).*
- 1.5. Ventilation rates are appropriate for the current facility requirements.*
- 1.6. System automatic reset functions are functioning appropriately, if applicable.*
- 1.7. Adjustments have been made to compensate for oversized or undersized equipment so that it is functioning as efficiently as possible.*
- 1.8. Simultaneous heating and cooling does not occur unless intended.*
- 1.9. HVAC system economizer controls are properly functioning, if applicable.*
- 1.10. The HVAC distribution systems, both air and water side, are balanced.*
- 1.11. Light levels are appropriate to the task.*
- 1.12. Lighting sensors and controls are functioning properly according to occupancy, schedule, and/or available daylight, where applicable.*

NEW YORK CITY'S ENERGY AUDIT AND RETRO-COMMISSIONING RULE

HVAC distribution balancing. All major systems that include chillers, boilers, cooling towers, air handlers, or pumps, must be tested for proper balance for current facility requirements. A major system as used in this subparagraph means a system that serves more than 10,000 square feet. If the system is found to be out of balance, the condition must be corrected and noted on the retro-commissioning report. System balancing may only be performed by an individual certified in the testing and balancing of HVAC systems by the National Environmental Balancing Bureau (NEBB), the Testing, Adjusting and Balancing Bureau (TABB), or the Associated Air Balance Council (AABC).

Exceptions:

1. if the HVAC distribution has been tested and balanced within the twelve months prior to the reporting date of the retro-commissioning report, then the records of such testing and balancing must be included in the retro-commissioning report and no further testing and balancing will be required.

2. if the HVAC distribution has been tested and balanced within the sixty months prior to the reporting date of the retro-commissioning report, then no further testing and balancing is required, provided that all of the following conditions are satisfied:

2.1. Space configurations have not been altered to affect the HVAC system since the prior testing and balancing; and

2.2. no new equipment has been installed and no existing equipment has been removed during the sixty months since the prior testing and balancing; and

2.3. if the major systems are controlled by a Building Management System (BMS), the BMS is monitoring or controlling all relevant equipment; and

2.4. if the system is controlled by a BMS, more than ninety percent of the remote sensors, control valves, and control dampers are monitored or controlled by the BMS; and

2.5. no piece of equipment is under manual control; and 2.6. fewer than ten percent of the diffusers in the system require replacement; and

2.7. if the system utilizes a Variable Air Volume (VAV) system, fewer than ten percent of the VAV terminal units are under manual control; and

2.8. if the system utilizes economizers, all economizers and economizer controls are fully functioning; and

2.9. the system supply air and water temperatures satisfy the current facility requirements.

3. If an HVAC system is out of balance but corrective work would be so extensive that it would require a work permit from the department, the condition need not be corrected in connection with the retro-commissioning but may be recommended for examination in connection with the energy audit.

New York City was the first to require energy audits and retro- commissioning

Did they get it right?

- What is the right *balance* between mandatory requirements and voluntary programs?
- What is the appropriate scope/level of testing?
- Should cities set standards for the people performing the work? Require certain licenses or certifications?
- What building types should cities focus on? Which need the most work?
- How can local organizations get involved in the policy development process?

Discussion



CITY

ENERGY



A JOINT PROJECT of NRDC + IMT

This concludes The American Institute of Architects
Continuing Education Systems Course

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