

Better Buildings Summer Webinar Series

We'll be starting in just a few minutes....

Tell us...

What topics are you interested in for future webinars?

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Next-Generation Building Performance Policies: Maximizing Energy Savings and Environmental Impacts

July 16, 2020

1:00 – 2:00 pm EDT



Adam Guzzo

Senior Advisor

U.S. Department of Energy

Weatherization & Intergovernmental Programs Office (WIP)

Market Leadership

Developing Innovative, Replicable Solutions with Market Leaders

- Better Buildings Challenge
- Better Buildings Alliance
- Better Buildings, Better Plants
- Better Buildings Accelerators
- Better Buildings Residential
- Superior Energy Performance

Innovation and Emerging Technologies

New technologies and new ideas are key to building a stronger economy

- Better Buildings Technology Campaigns -
- lighting, HVAC, Energy Analytics

Better Information

Making Energy Efficient Investments Easier

- Better Buildings Solution Center
- Financing Navigator
- Improved Data and Consistency Access
- Tools to Assess the Efficiency of Buildings/Homes
- Tools for Energy Management

Workforce Development

Expanding the Workforce

- Better Building Workforce Guidelines
- Industrial Energy Management Workforce



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Where are you joining us from today?

Please go to www.slido.com and enter code #DOE to respond

What sector best describes your organization?

Please go to www.slido.com and enter code #DOE to respond

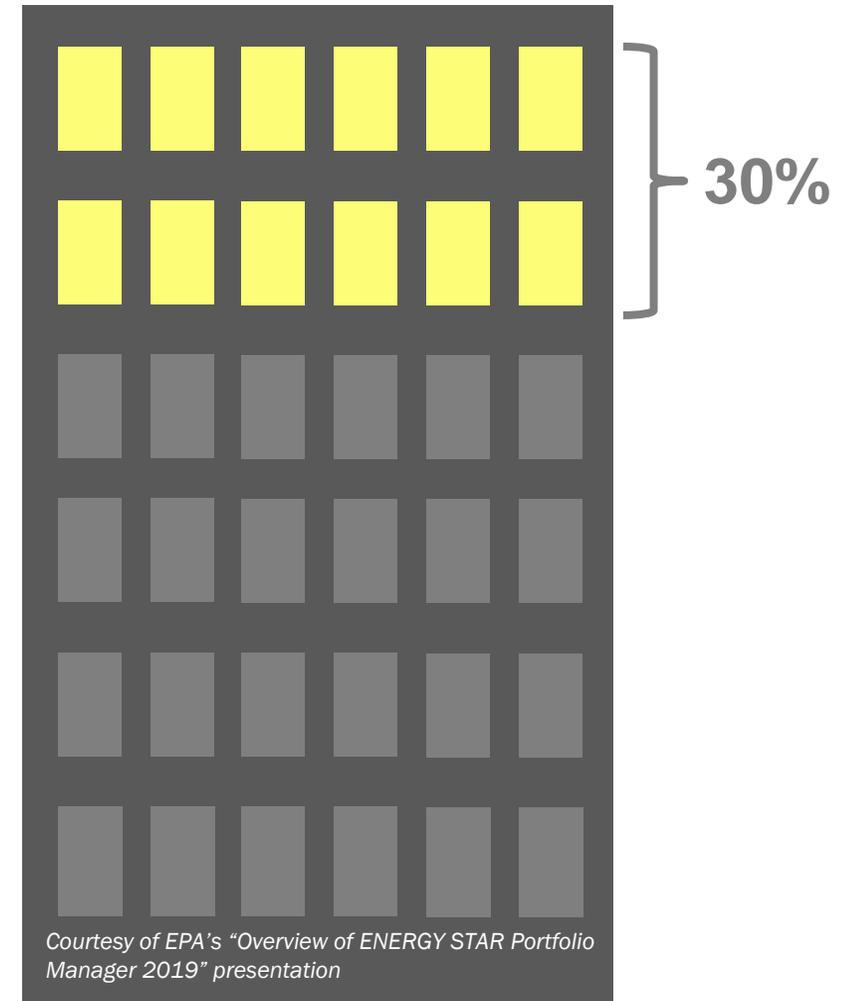
National Building Energy Efficiency Opportunity and Impact

Opportunity

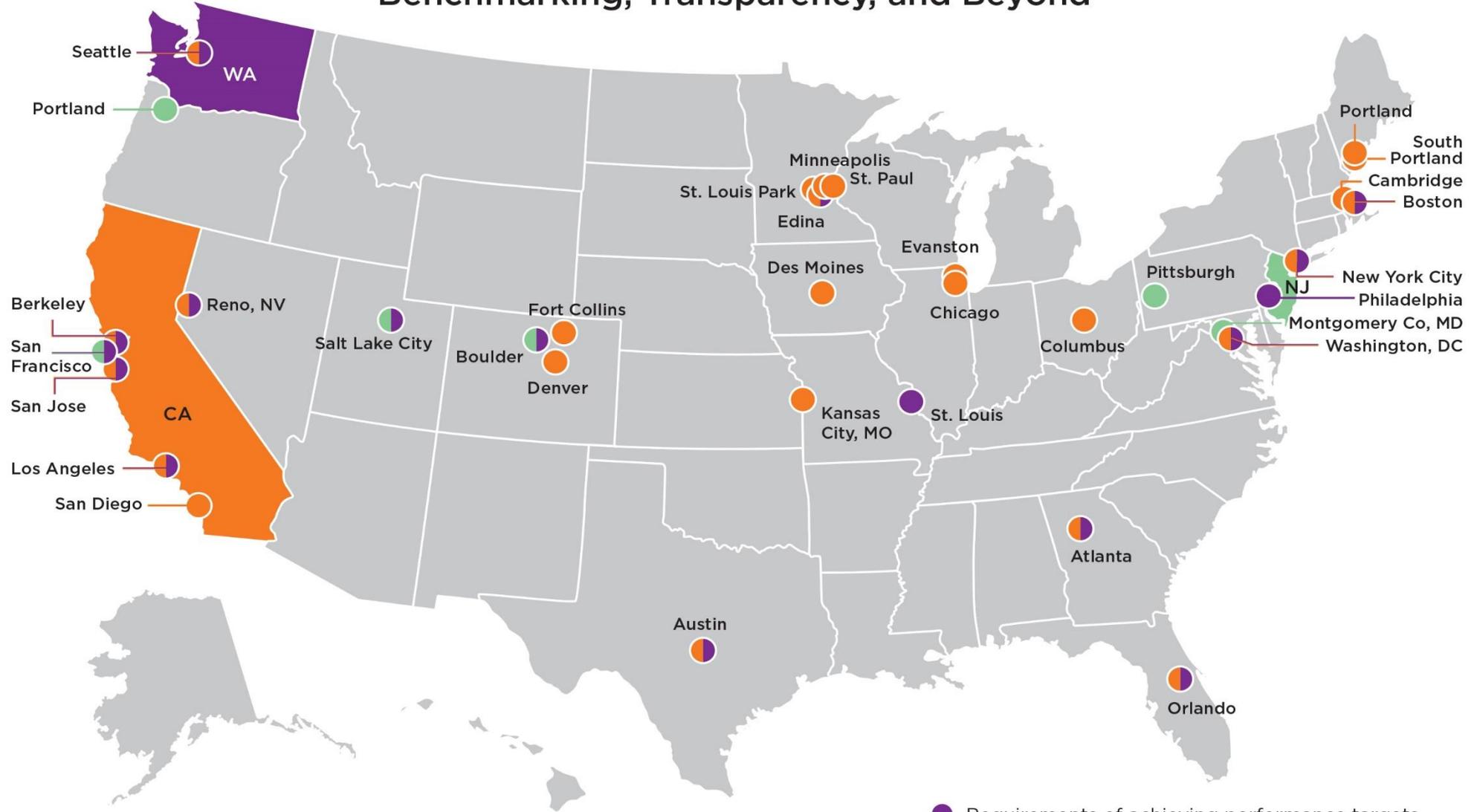
- **\$400 billion/year** spent in the U.S. to power our buildings
- **74%** of all U.S. **electricity** is used in buildings
- **50%** of the nation's **5.6 million commercial buildings** were built before 1980
- **30%** of the energy used in buildings is wasted on average

Impact

- **\$120 billion** in annual savings if we cut the energy use of U.S. buildings by 30%



U.S. City, County, and State Policies for Existing Buildings: Benchmarking, Transparency, and Beyond



- Requirements of achieving performance targets or completing additional actions
- Benchmarking policy for public, commercial, and multifamily buildings adopted
- Benchmarking policy for public and commercial buildings adopted



Is your jurisdiction currently considering passing a policy targeting energy use in new or existing commercial buildings?

Please go to www.slido.com and enter code #DOE to respond

Today's Presenters



Nicole Ballinger
City of Seattle, Washington



Dave Epley
District of Columbia



Rajiv Ravulapati
City of St. Louis, Missouri



Nicole Ballinger

Buildings & Energy Advisor
Office of Sustainability & Environment
City of Seattle, Washington

Submit Questions
www.slido.com event code **#DOE**

Accelerating Tune-Ups in Existing Buildings - Seattle, WA

Nicole Ballinger

Buildings & Energy Advisor

Office of Sustainability & Environment

US DOE Better Buildings Summer Series - July 16, 2020



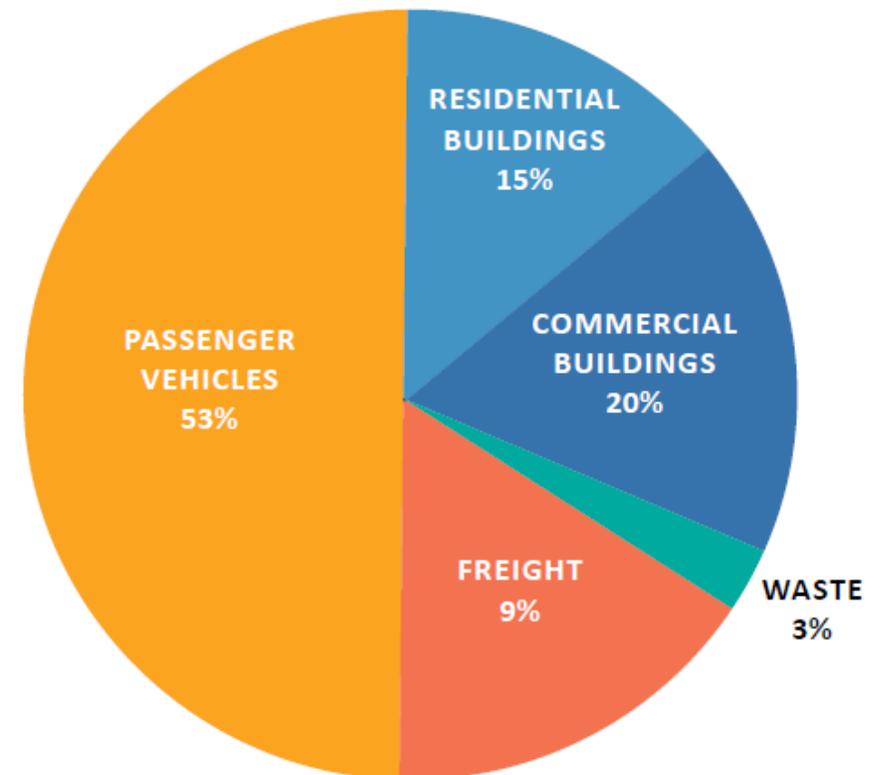
City of Seattle

Seattle Climate Action Plan

Buildings make up over 1/3 of Seattle's core GHG emissions

- Goal & Targets:
 - Zero Net GHG Emissions by 2050
 - 2030 Target: Buildings must reduce emissions by 39% from a 2008 baseline
- Commercial Existing Building Policies:
 - Energy Benchmarking & Reporting – 2012
 - Commercial & Multifamily 20,000 SF + (~3,300 bldgs)
 - Seattle Building Tune-Ups – 2016
 - Commercial 50,000 SF + (~1,000 bldgs.)

2016 GHG Sources



Source: 2016 Seattle Community GHG Inventory

Tune-Up Assessment Requirements

39 Total Elements

- **20 Required** to implement if deficient
- **19 Voluntary** to implement if deficient

Operating Protocols

- HVAC systems
- Lighting
- Water heating
- Water usage

Maintenance & Repair

- HVAC systems
- Lighting
- Water heating
- Water usage
- Envelope

Examples of Operating elements

“Review HVAC equipment schedules.”

“Set schedules to optimize operations for actual building occupancy patterns.”

Examples of Maintenance, Cleaning, and Repair elements

“Verify HVAC equipment is clean and adequately maintained.”

“Clean where adversely impacting system performance.”

Elements of a Seattle Tune-Up

- **Find a Qualified Tune-Up Specialist**
 - a building energy professional with seven years of experience & and one of several training or certification programs.
- **Conduct a Building Assessment**
 - assess systems to identify operational or maintenance issues
 - review energy benchmarking data and water bills
- **Identify Corrective Actions**
- **Implement Required Corrective Actions**
- **Verify Changes & Report to City of Seattle**



TUNE-UP SCHEDULE

Ongoing, every five years

BUILDING SIZE*	ALTERNATIVE COMPLIANCE DUE DATE	TUNE-UP SUMMARY REPORT DUE DATE
200,000+ SF	September 4, 2018	March 1, 2019
100,000-199,999 SF	April 1, 2019	October 1, 2019
70,000-99,999 SF	October 1, 2020	April 1, 2021
50,000-69,999 SF	April 1, 2021	October 1, 2021

* *Excluding parking*

www.seattle.gov/buildingtuneups



Building Tune-Up Accelerator (TUA) Program

- US DOE supported program
- Mid-size buildings (approx. 100,000 SF or smaller) due 2020 or 2021
- Tune-up “early” to meet Seattle Building Tune-Ups requirements
- Financial incentives & enhanced technical support – offer sunset after 2018
- Goal of 20% average energy savings across at least 100 buildings or spaces and 99.7 Million kBtu/year (~\$1.5 million annual savings)

2017

» Q4 2019

SEATTLE
BUILDING TUNE-UP ACCELERATOR

Tune-Up to Accelerate Your Building's Energy Savings!

And get help doing it! We're recruiting owners or managers of up to 100 mid-size nonresidential buildings (100,000 SF or less) to jump-start their building's Tune-Up. Don't miss out on technical support and financial incentives for a tune-up that meets the new Seattle Building Tune-Ups requirement – **funding that will sunset after 2018**. Complete a building assessment and implement corrective operations and maintenance actions or do more for deeper energy savings and a more valuable building asset.

ACCELERATOR INCENTIVES

BASIC TUNE-UP
Seattle City Light incentive of up to \$0.12 per SF for the tune-up assessment and corrective actions. Buildings with interval data will also be offered a complimentary virtual energy assessment and may be eligible for additional incentives for energy saved.

TUNE-UP PLUS
Includes the Basic Tune-Up plus Seattle City Light rebates for energy-saving improvements including lighting, HVAC and more.

BUILDING RENEWAL
UW Integrated Design Lab support for energy modeling and Spark Tool savings/income analysis for more complex projects. Above and custom incentives may apply.

ACCELERATOR BENEFITS

Financial and technical support

Meet your building's 1st required tune-up

Pick from qualified providers that will help you through the Program

Technical support from Smart Buildings Center

Asset Score analysis that rates a building & identifies cost-saving opportunities

Basic Tune-Up can save 10-15% — more with renewal

89.2%

TUNE-UP SCHEDULE

Ongoing, every five years

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* Excluding parking

www.seattle.gov/buildingtuneups

TUA Program Partners & Funding

Partner	Primary Role
 U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy	Federal funding (\$1.2 million) and project oversight
 Seattle Office of Sustainability & Environment	Program management, enrollment, coord. w/ Building Tune-Ups, evaluation, reporting to DOE
 SMART BUILDINGS CENTER	Provider training & curricula, tool lending library, project tracking, help desk
 Pacific Northwest NATIONAL LABORATORY <small>Proudly Operated by Battelle Since 1965</small>	Building Re-Tuning training, Asset Score support & research on energy-savings from tune-ups
 Seattle City Light	Tune-up and energy conservation measure incentives
 INTEGRATED DESIGN LAB <small>UNIVERSITY of WASHINGTON // W</small>	Building Renewal strategic plan development and support, Spark Tool engagement

TUA Tune-Up Specialist Trainings

- ✓ 85 service providers attended trainings
- ✓ 30 firms on the “TUA” provider list
 - ✓ 16 firms participated in projects
 - ✓ Seattle Public Schools RCx /RCM staff
 - ✓ King County RCM staff

Tune-Up Accelerator Service Providers Last Updated 6.6.18

Company Name & Address	Contact for Tune-Up Accelerator Inquiries	Website
ACCO Engineered Systems 5300 Denver Ave S Seattle WA 98108	Joseph Balducci jbalducci@accos.com 206-787-8525	www.accos.com
Ameresco, Inc. 222 Williams Ave South, #100 Renton WA 98057	Jason Hite jhite@ameresco.com 206-708-2952	www.ameresco.com
ArchEcology, LLC 1808 Bellevue Ave, Suite 202 Seattle WA 98122	Katherine Morgan katherinem@archecology.com 206-717-2269	www.archecology.com
ATA Automation 450 Stewart Ave South Renton WA 98057	Pete Segall pete@atainc.org 425-951-8660	www.atainc.org
360 Analytics 710 2nd Ave, Suite 925 Seattle WA 98104	Lukas Hovee lukas@360-analytics.com 206-557-4732 x202	www.360-analytics.com
Ecotope, Inc. 1917 1st Ave, Suite 300 Seattle WA 98101	Morgan Heater morgan@ecotope.com 206-496-4709	www.ecotope.com
Elemental Commissioning Company 4440 25th Ave W Seattle WA 98199	Jessica Saborin jessica@elementalcs.com 206-484-2403	www.elementalcs.com
Energy 360, Inc. 3033 3rd Main St, Suite 1 Portland OR 97214	Chris Smith chris@energy360.com 971-544-2111	www.energy360.com
Engineering Economics, Inc. 1201 Western Avenue, Suite 325 Seattle WA 98101	Brendon Mattis brendon.mattis@eeengineers.com 206-822-1001	www.eeengineers.com
FSI consulting engineers 506 2nd Ave, Suite 700 Seattle WA 98104	Ben Rouff benr@fsi-engineers.com 206-422-3321 x236	www.fsi-engineers.com
Hargis Engineers, Inc. 1201 3rd Ave, Suite 600 Seattle WA 98101	Michael Baranick michael.baranick@hargis.biz 206-436-0448	www.hargis.biz
Hermanson Company 1221 2nd Ave N Kent WA 98032	Ran Duchman kacydman@hermanson.com 206-857-6132	www.hermanson.com
Houlder Parks 4605 South 134th Place Seattle WA 98148	Ewing Chang ewchang@holderparks.com 206-248-9700	www.holderparks.com
Hughes LLC 601 Union St, Ste 4200 Seattle WA 98101	George Amburn gamburn@hughes.com 206-321-5098	www.hughes.com
Integrity Energy Solutions 14405 SE 36th St, Suite 210 Bellevue WA 98006	Matt Montagnier mattm@iesinnovates.com 206-413-7693	www.iesinnovates.com
Keith Barber Associates 565 Andover Park West, Suite 101 Tukwila WA 98188	Kent Barber kent@keithbarber.com 206-947-8879	www.keithbarber.com
MacDonald Miller Facility Solutions 7117 Seneca Ave SW Seattle WA 98166	Greg Neul greg.neul@mmf.com 206-768-4002	www.mactiller.com
McKinstry Essentlon LLC 5005 3rd Ave S Seattle WA 98134	Ilic Cochrane ilic@mckinstry.com 206-532-8250	www.mckinstry.com
MENG Analysis 2005 Western Ave Suite 200 Seattle WA 98121	Doug Smith doug@menganalysis.com 206-587-3797	www.menganalysis.com
Neudorfer Engineers, Inc. 5516 1st Ave S Seattle WA 98108	Jeff Harding jharding@neudorferengineers.com 206-483-2957	www.neudorferengineers.com
NorthWest Engineering Service, Inc. (NWSW) 7000 SW Redwood Lane Tigard OR 97224	John Harborth johnh@nws.com 503-701-8138	www.nws.com
Paradise and Company 1932 1st Avenue Suite 200 Seattle WA 98101	Hanna Swarnak hanna@paradiseandco.com 206-957-8685	www.paradiseandco.com
PSR Mechanical 3132 NE 133rd St Seattle WA 98125	Neil Bavins neil.bavins@psrmechanical.com 206-367-2500 x339	www.psrmechanical.com
Siemens - PNW Energy Service 15900 SE Eastgate Way, Ste. 200 Bellevue WA 98008	Andrew Waymire andrew.waymire@siemens.com 425-281-4706	www.siemens.com
Sazan Environmental Services 601 Stewart Street, #1400 Seattle WA 98101	Kevin David kevin@saan.com 206-267-1700	www.sazan.com
Solars 1501 E Madison St, Suite 200 Seattle WA 98112	Mike Harton mikeh@solars-energygroup.com 242-349-0666	www.solars-energygroup.com
Svevek Consulting Engineers, LLC 7049 26th Ave NW Seattle WA 98117	Tressa Svevek tressa@svevek.com 206-401-6681	www.svevek.com
The Cadmus Group 720 SW Washington St, Suite 400 Portland OR 97205	Katie Leichter katrina.leichter@cadmusgroup.com 503-467-7159	www.cadmusgroup.com
The Greenbusch Group, Inc. 1900 West Nickerson Street, Suite #201 Seattle WA 98119	John Greenlaw john@greenbusch.com 206-378-0569 x111	www.greenbusch.com
University Mechanical Contractors, Inc. 11611 49th Place West Mukilteo WA 98275	Trey Turjan tturjan@umci.com 425-407-2153	www.umci.com

The firms listed above have staff that attended an Accelerator Program training and meet the requirements of the "Tune-Up Specialist" however, this list is not intended for 100% or 100% fee for contractor recommendation. It is not a contractor recommendation. It is only a list of firms that are qualified to provide facility engineering and energy conservation services for buildings and are not making any such recommendation.



Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by **Battelle** Since 1965

SMART BUILDINGS CENTER

TUA Incentives & Program Paths

A. BASIC TUNE-UP

City Light incentive of up to **\$0.12 per SF** for a tune-up that meets requirements

B. TUNE-UP PLUS

Plus incentives for energy-saving improvements like lighting, HVAC

C. BUILDING RENEWAL

Support for deeper investments like renovations or tenant improvements with 3 different levels of technical support

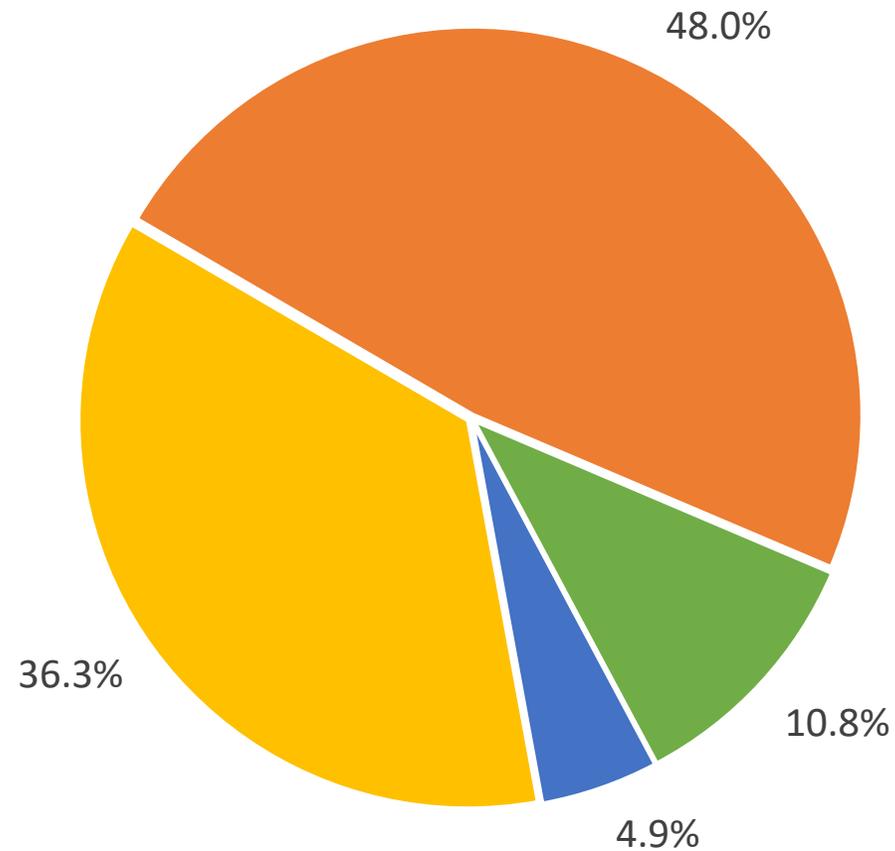


2017

» Q4 2019

TUA Participant Buildings By Size

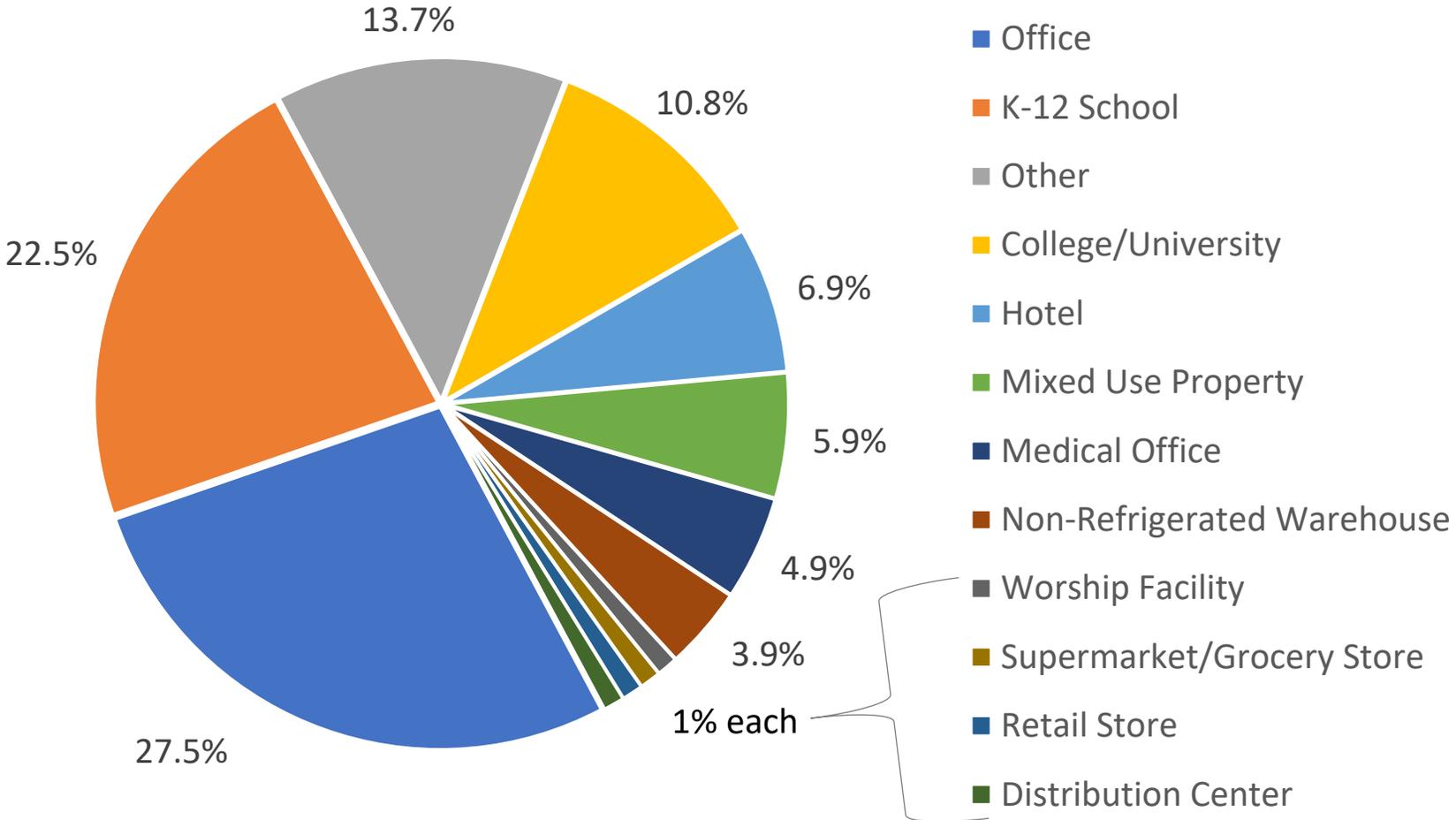
102 buildings
completed the
Accelerator



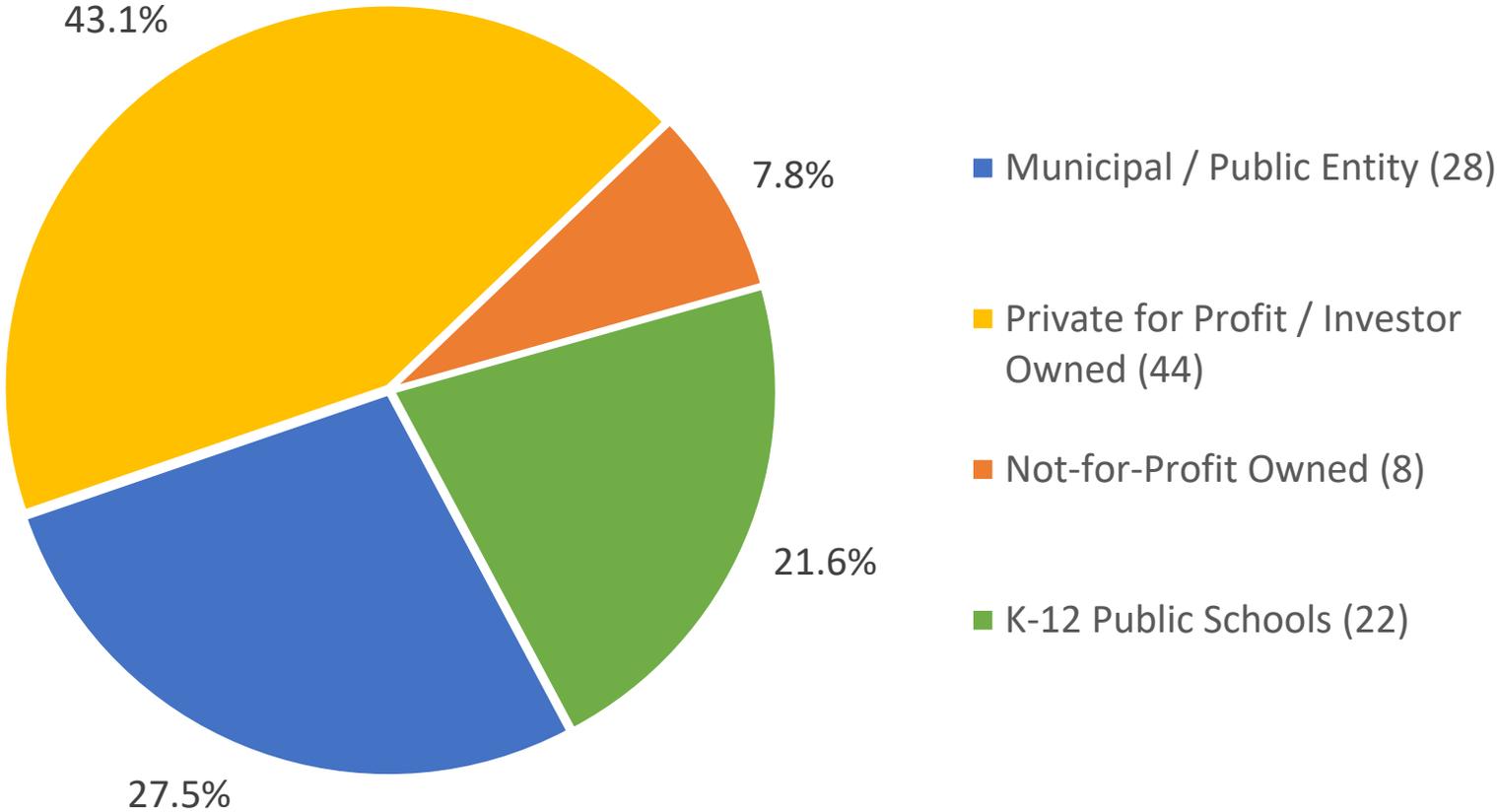
6.9 Million SF Total!
Average = 67,700 SF

- > 100 - 110K SF (5 Buildings)
- 70 - 99K SF (37 Buildings)
- 50 - 69K SF (49 Buildings)
- < 50K SF (11 Buildings)

TUA Participant Buildings By Type



TUA Participant Ownership



TUA Top Required Tune-Up Measures

Top 6 out of 20 required measures in 102 TUA mid-size buildings.

Required Implementation Tune-Up Measure	Found & Corrected
G1 – Review HVAC equipment schedules	58%
G2 – Review HVAC set points	49%
G6 - Verify HVAC controls are functioning as intended	41%
G5 - Verify that HVAC sensors are functioning, calibrated, and in appropriate locations	40%
G17 – Check valves and dampers and adjust	36%
G11 – Verify HVAC equipment maintenance	34%



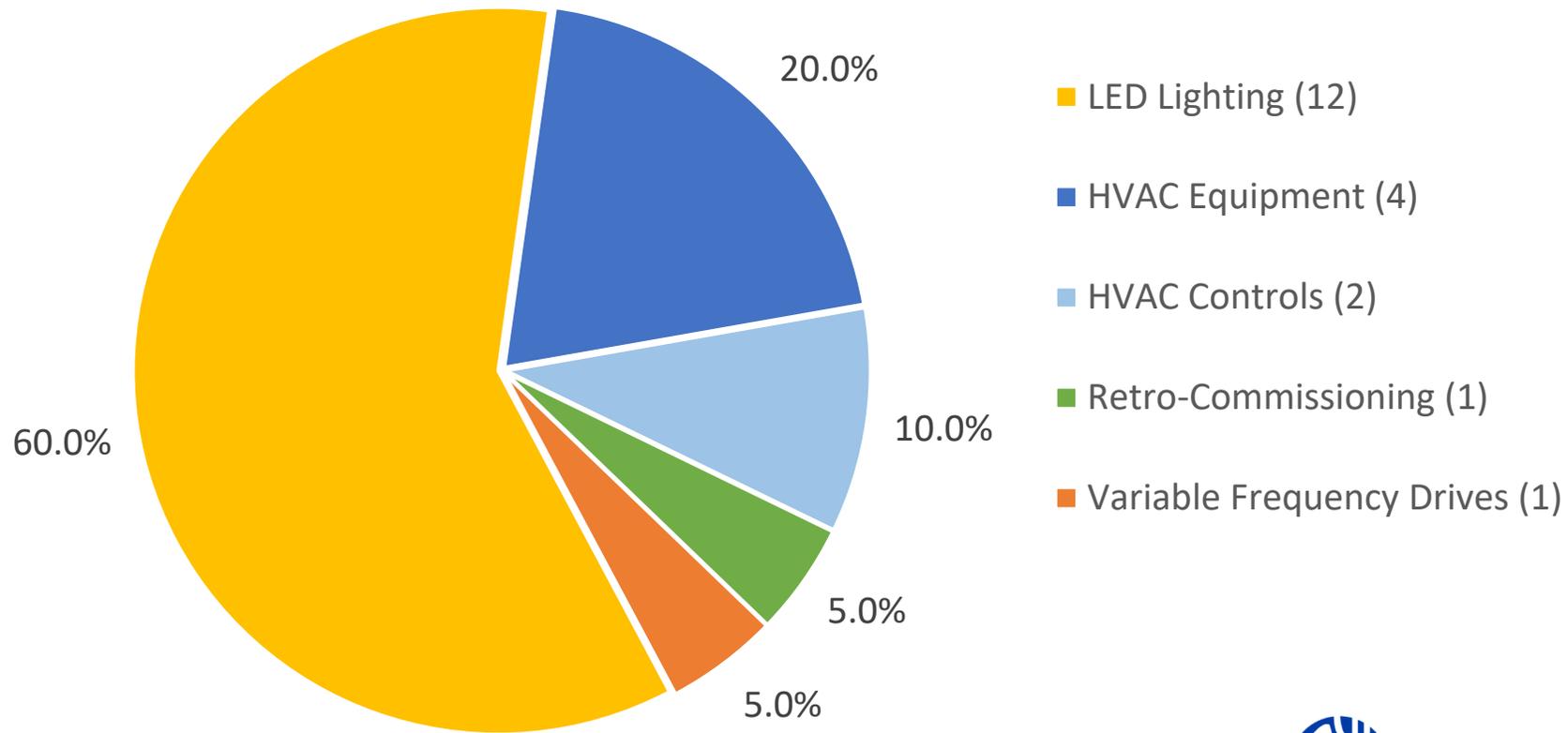
TUA Top Voluntary Tune-Up Measures

Top 6 out of 19 voluntary measures in **102 TUA mid-size buildings**.

Voluntary Implementation Tune-Up Measure	Found	Corrected
H4 – Identify inefficient lighting	64%	20%
G18 - Identify equipment approaching the end of its service life , per ASHRAE	49%	10%
H2 – Verify lighting sensors are working and located appropriately	36%	17%
J12 – Check water flow fixtures	34%	10%
G9 – Identify areas with indications that ventilation rates may vary significantly from ASHRAE 62.1	33%	11%
G15 – Motor, fan, pump, belts, etc. repairs	25%	12%



TUA Tune-Up Plus ECMs with City Light



Based on 20 ECMs in 19 TUA enrolled buildings.



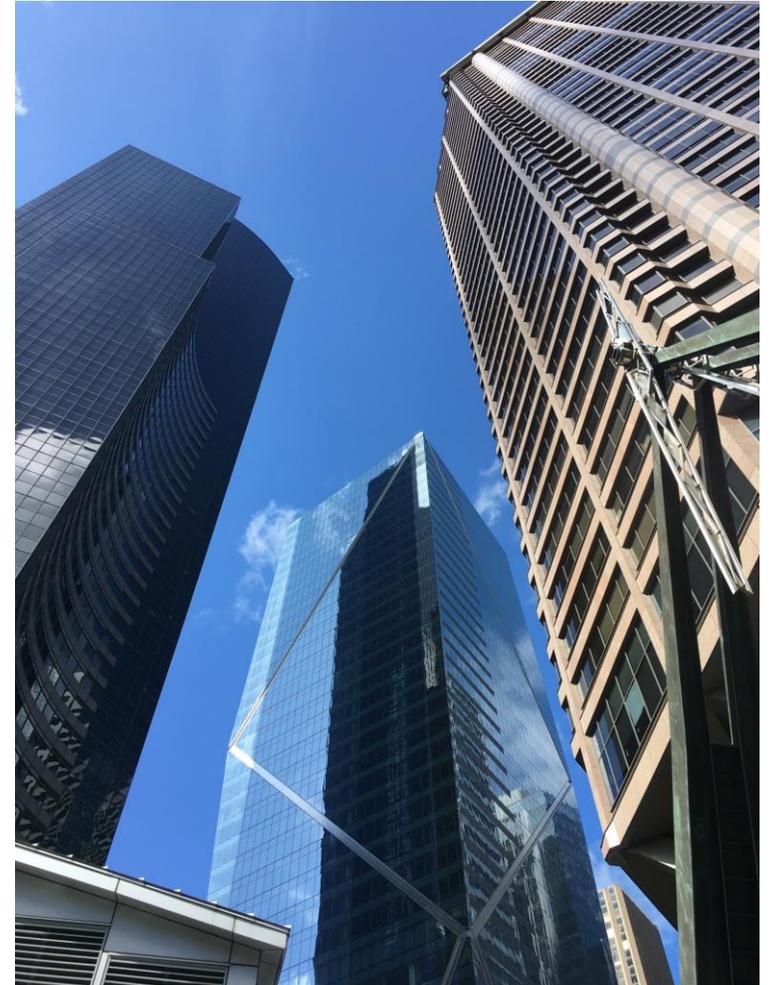
Seattle City Light

**Sneak
Preview!**

SBTU Top Required Tune-Up Measures

Top 6 out of 20 required measures in 170 SBTU large buildings 100,000 SF+.

Required Implementation Tune-Up Measure	Found & Corrected
G5 - Verify that HVAC sensors are functioning, calibrated, and in appropriate locations	47%
G2 – Review HVAC set points	45%
G6 - Verify HVAC controls are functioning as intended	45%
G17 – Check valves and dampers and adjust	42%
G1 – Review HVAC equipment schedules	40%
G14 – Motor, fan, pump, belts, etc. maintenance	30%



**Sneak
Preview!**

SBTU Top Voluntary Tune-Up Measures

Top 6 out of 19 voluntary measures in 170 SBTU large buildings 100,000 SF+.

Voluntary Implementation Tune-Up Measure	Found	Corrected
H4 – Identify inefficient lighting	44%	15%
G18 - Identify equipment approaching the end of its service life , per ASHRAE	40%	9%
K1 – Envelope penetrations	28%	12%
J12 – Check water flow fixtures	28%	11%
G8 – Air balancing issues	27%	14%
G15 – Motor, fan, pump, belts, etc. repairs	25%	12%



TUA Evaluation: M & V Sample

- Evaluated 10 buildings (TUA Only)
 - Office (3)
 - K-12 School (2)
 - Mixed Use (1)
 - Hotel (1)
 - Medical Office (1)
 - College/University (1)
 - Non-Refrigerated Warehouse (1)
- Site Visits
- Pre-Post Energy Data Analysis



SBC staff and building facility manager retrieve a HOBO UX90 motor runtime logger used to verify reduced parking garage exhaust fan schedule. It was confirmed.

TUA M & V: Post Tune-Up Savings

Building Energy Consumption & Emissions Savings Post-Tune-Up in M & V Sample Buildings 2017 vs. 2019 Non-Normalized. (Increases in energy or emissions shown as negative numbers).

Building	Electric %	Natural Gas %	Total Energy %	GHG Emissions %	Total Energy (kBtu)	Total Emissions (MT CO2e)	Months of Post Tune-Up Energy Data*
1	-2.6%	-0.4%	-1.6%	-0.6%	-69,730.46	-0.7	8
2	14.4%	13.3%	14.4%	13.8%	483,393.4	3.6	12
3	5.6%	<i>see note</i>	5.6%	5.6%	147,560.98	0.6	9
4	-6.5%	<i>see note</i>	-6.5%	-6.6%	-107,847.83	-0.5	12
5	-2.0%	16.4%	11.6%	15.9%	371,176.6	20.5	12
6	2.8%	<i>see note</i>	2.8%	2.7%	64,585.75	0.3	8
7	13.1%	27.7%	22.2%	27.1%	734,333.0	31.0	8
8	16.7%	-4.4%	13.2%	1.6%	656,430.8	1.0	12
9	5.1%	13.6%	8.9%	12.8%	367,870.9	13.9	9
10	12.8%	<i>see note</i>	12.8%	12.7%	517,516.5	2.1	9
Average Savings	5.9%	11.0%	8.3%	8.5%	316,529.0	7.2	10

Source: Building Tune-Up Accelerator Program Final Technical Report, Table 15

http://www.seattle.gov/Documents/Departments/OSE/Tune-Ups/DE-EE0007556_Seattle_Final_Technical_Report_May2020.pdf

TUA Final Program Savings Estimates

20% Average

Basic Tune-Up: 10% → 7%

Tune-Up Plus: 20% → 15%

Building Renewal: 35% → 35%

Total Average: 20% → 12%
kBtu/yr: 99.0 → 67.8 million
Seattle GHG: 13.3%
MT CO₂e/yr: 10,500

TUA Post-Participation Survey

✓ Positive Program Experience & Benefit to Building Operations

- **80% agreed to:** *Overall, participating in the Tune-Up Accelerator Program was beneficial to my building or organization.*

✓ Strong Satisfaction with the Tune-Up Specialist

- **75% agreed to:** *Service providers that want to conduct Seattle Building Tune-Ups should be required to attend a City of Seattle program training.*

✓ The Tune-Up Drives ECM Participation

- **80% “Yes”:** *After your participation, did you implement, or have you planned/budgeted for any voluntary ECM(s) beyond the required actions of the tune-up?”*

✓ Offering an Incentive & Technical Support for Early Compliance is Good Policy

- **93% “Yes”** - *The City should use incentives and extra technical support to engage building owners with early compliance.*

SEATTLE building tune-ups

CASE STUDY Hotel Five

Hotel Five is a funky and fun boutique hotel in Seattle's downtown core boasting a lobby filled with games. Part of the Staypineapple brand, Hotel Five caters to families, professionals, and their furry companions.

The 52,000 SF hotel includes 116 guest rooms, a full-service restaurant, bar, and an espresso stand in the lobby. The hotel is within walking distance to major attractions like Pike Place market and six blocks from light rail transit. To further provide car-free options, guests also have free access to bicycles during their stay.

In 2018, Hotel Five participated in the City of Seattle's Building Tune-Up Accelerator Program to get a head start on their required Tune-Up, which is designed to help building owners identify smart, responsive ways to reduce energy and water costs. What hotel managers discovered, however, is that doing a Tune-Up not only helped them save energy, water, and money, it also helped them develop a tailored roadmap and budget for future improvements to the building to further boost the hotel's sustainability.

Near-term energy and water saving opportunities identified at the hotel right away. Hotel Five has an air conditioning (HVAC) units with independent controls in the house, and in guest rooms. Upon inspection of the building, the Tune-Up specialist found that several needed immediate maintenance. Water fixtures benefit from better ongoing upkeep. Water fixtures that showed leaks were leaking in more than 10 gpm. These leaks were addressed and repaired. These fixes are projected to save the building \$3,000 in addressing these issues and water costs.

HOTEL FIVE	COSTS
52,000 SF	
ASSESSMENT	\$5,500
REQUIRED ACTIONS	\$3,000
TOTAL	\$8,500

Want to learn more?
seattle.gov/buildingtuneups

CASE STUDY CONCORD INTERNATIONAL ELEMENTARY SCHOOL

Concord International Elementary School provides its student body with a global education and perspective to help them succeed in a 21st century world. A recent Building Tune-Up is providing students a healthier, more comfortable place to learn, work and play.

Concord public school is located along the Duwamish River in the South Park neighborhood of Seattle. It serves a multiracial community of 347 students, 74% of whom were on free or reduced-price lunch plans during the 2017-2018 academic year.

Built in 1913, the 64,500 SF Concord building was originally designed in the Colonial Revival style and constructed in brick, steel and heavy timber. It is listed as a Seattle Historic Preservation Landmark. In 2000, the building was renovated to add a new gym and several classrooms.

In 2018 and 2019, the Seattle Public School District's in-house retro-commissioning staff of four formed a "Tune-Up team" to ensure its 113 school buildings' energy and energy systems met or even exceeded the Seattle Building Tune-Ups requirements. Working with the District's Resource Conservation Specialists to review past energy use, the team also identified elementary schools in need of immediate fixes that could benefit from participating in the City of Seattle's Tune-Up Accelerator Program to get a head start on their required Tune-Ups, including Concord.

"We were already doing a fair job managing the building, but we could only address the obvious things that were broken or not working right. The Tune-Up program gives us the opportunity to have our retro-commissioning staff dig in deep and find the source of a problem that isn't as obvious. That's the best thing about this program—finding the hidden opportunities is a big win."

—BINA FARVADE-CROSS, SPS RESOURCE CONSERVATION SPECIALIST

Undergoing the Tune-Up process revealed the importance of occupant behavior. No matter how energy efficient a building is, SPS Resource Conservation Specialist Rina Farvaade-Cross notes, "We need the teachers, staff and students to take action, if we get everything done and people still leave doors and windows open, our fixes won't accomplish much. When we all change habits and follow-through on energy-smart actions, we'll see really significant savings."

Want to learn more?
seattle.gov/buildingtuneups

WHAT IS A BUILDING TUNE-UP?

Building Tune-Ups are assessments of building energy and water systems to detect and correct operational or maintenance problems. Through Tune-Ups, building owners find operational issues that improve building efficiency and lower- and no-cost expenses. The City of Seattle requires Tune-Ups every five years for buildings with 50,000 SF or more of non-residential space.

SEATTLE building tune-ups

CASE STUDY CONCORD INTERNATIONAL ELEMENTARY SCHOOL

Concord school circa 1965

Want to learn more?
seattle.gov/buildingtuneups

Seattle Office of Sustainability & Environment

Beyond Tune-Ups... Next Steps

- WA State Building Performance Standards
- Future Seattle Building Performance Standards
- Seattle Green New Deal – Good, Clean Energy Jobs!
- Increased Support: “Hubs” & Financing



Q & A

Submit Questions
www.slido.com event code **#DOE**



Dave Epley

Associate Director for Data & Benchmarking Division
Department of Energy & Environment
District of Columbia

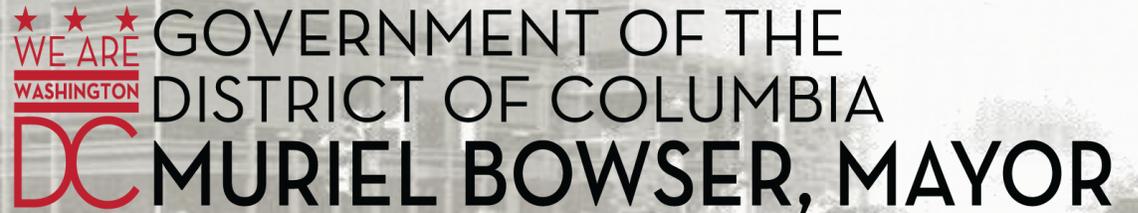
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DC'S BUILDING ENERGY PERFORMANCE STANDARDS

Next-Generation Building Performance Policies: Maximizing Energy Savings and Environmental Impacts

David Epley

July 16, 2020



SUSTAINABLE DC VISION

A group of about ten people are kayaking on a calm river. They are wearing life jackets and using paddles. The kayakers are in various colored kayaks, including yellow, red, and green. In the background, there is a concrete bridge and a dense line of trees with some autumn-colored foliage. The sky is clear and blue.

Make DC the healthiest, greenest, most livable city in the country.

GOALS: 2032



ADAPT TO CLIMATE CHANGE

CLIMATE READY BUILDINGS

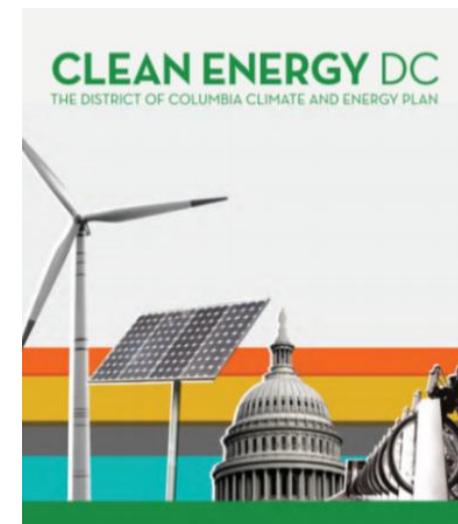
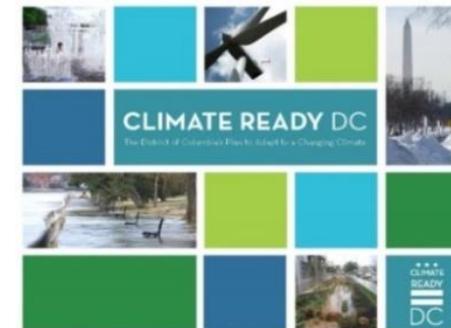
CUT ENERGY USE 50%

50% RENEWABLE ENERGY

NET ZERO NEW BUILDINGS

NET ZERO RETROFITS

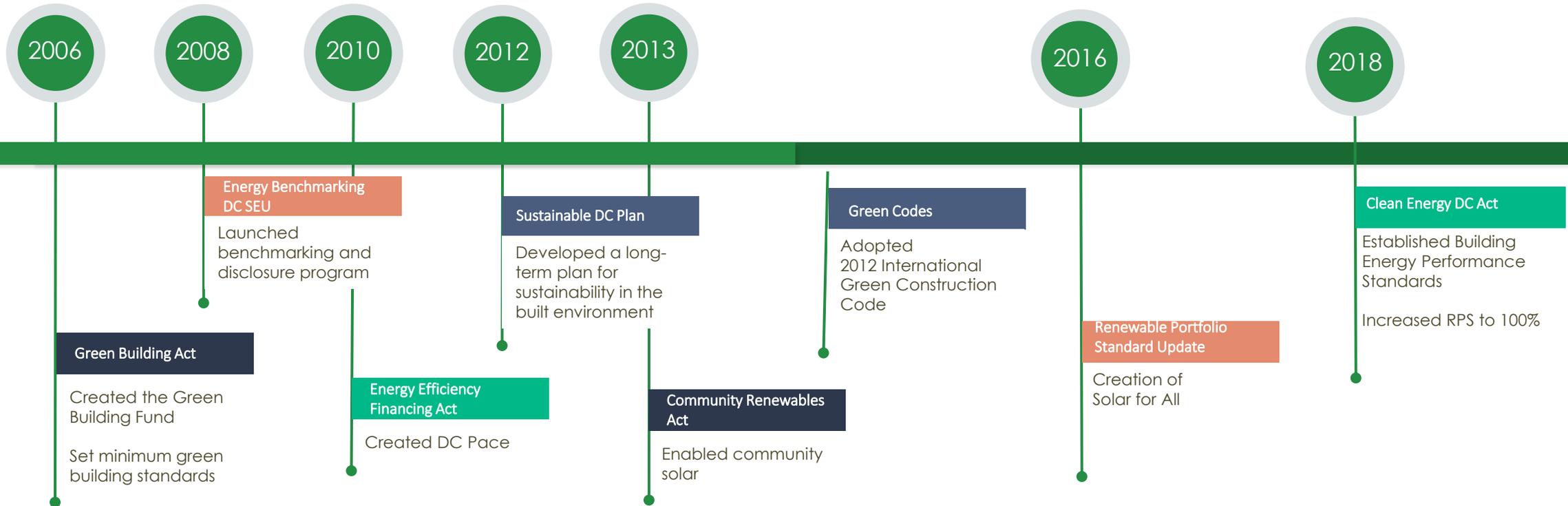
CUT GHG EMISSIONS 50%



MAYOR BOWSER: COMMITTED TO ZERO CARBON BY 2050

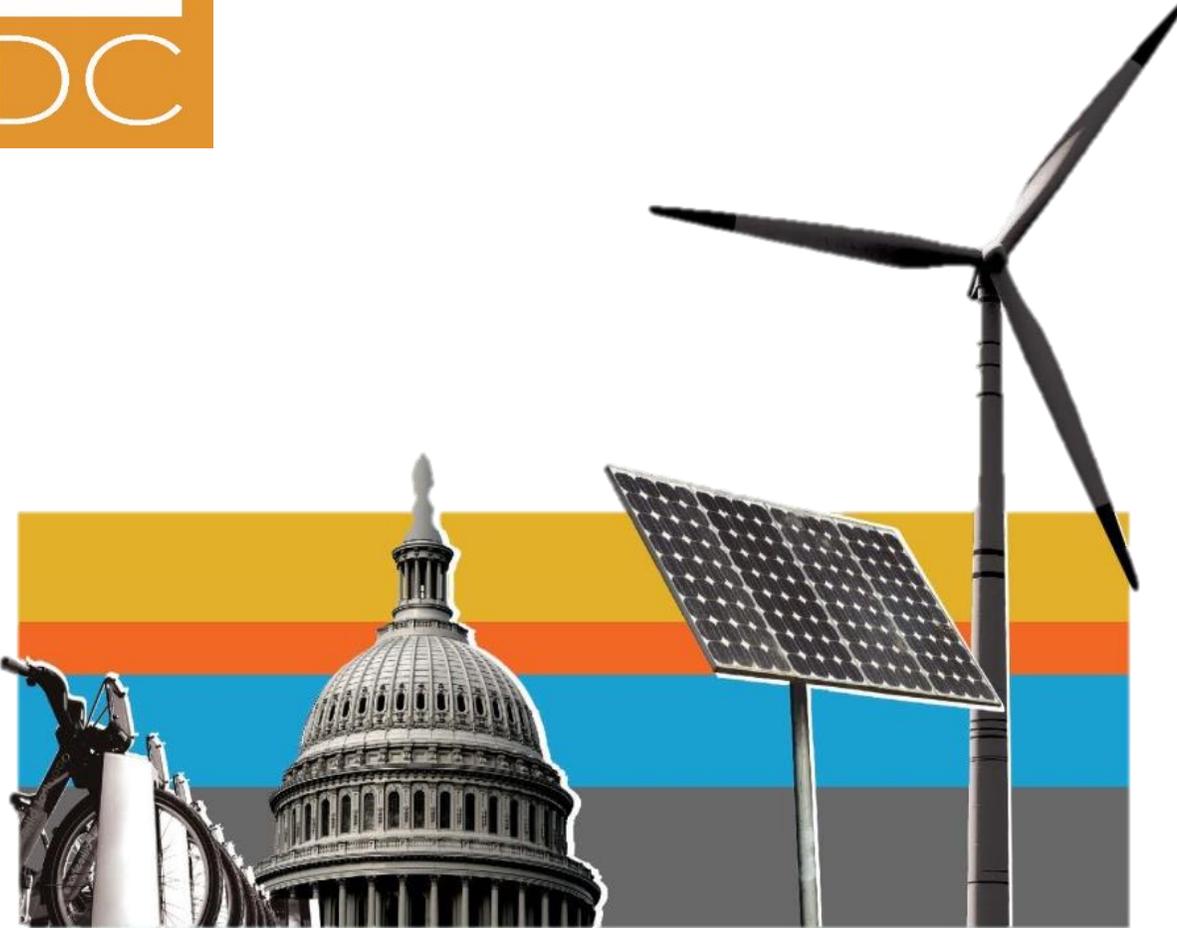


POLICY TIMELINE





CLEAN ENERGY DC MEANS....



CLEAN ENERGY DC OMNIBUS ACT OF 2018

New Buildings

Adopt mandatory **Net-Zero Energy codes** by 2022/2026

Existing Buildings

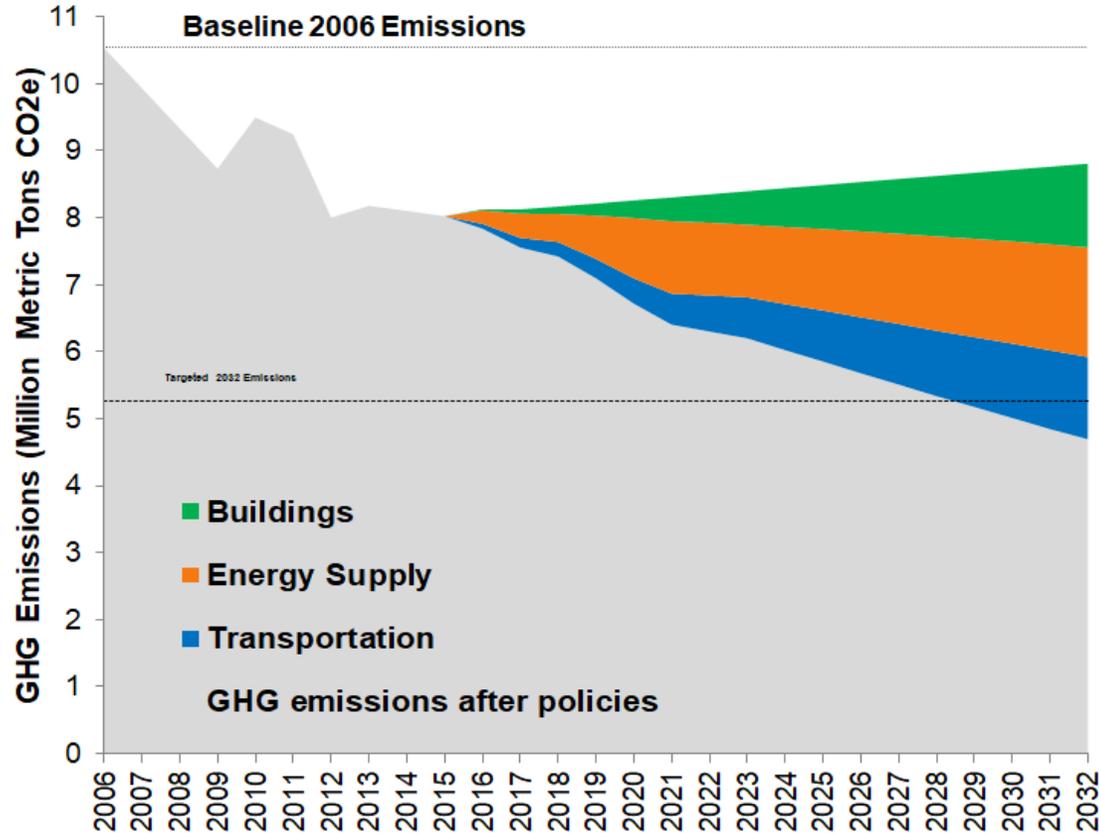
Improve the performance of existing buildings by implementing a **Building Energy Performance Standard**

100% Renewable Electricity

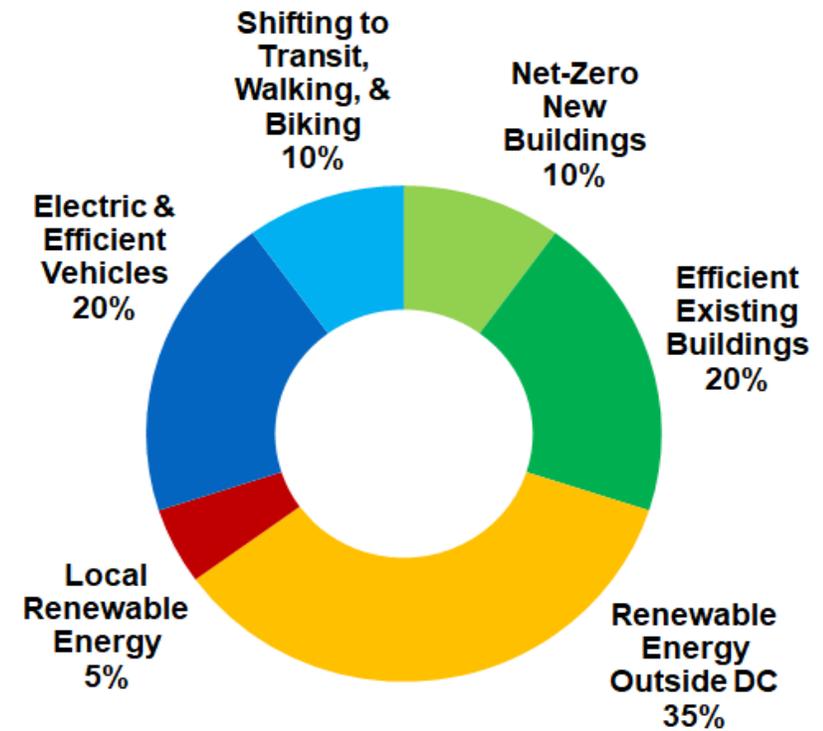
Require **100% renewable electricity** by 2032, and **10% from local solar** by 2041

CLEAN ENERGY DC PLAN

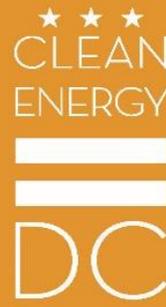
ESTIMATED GHG SAVINGS: 56%



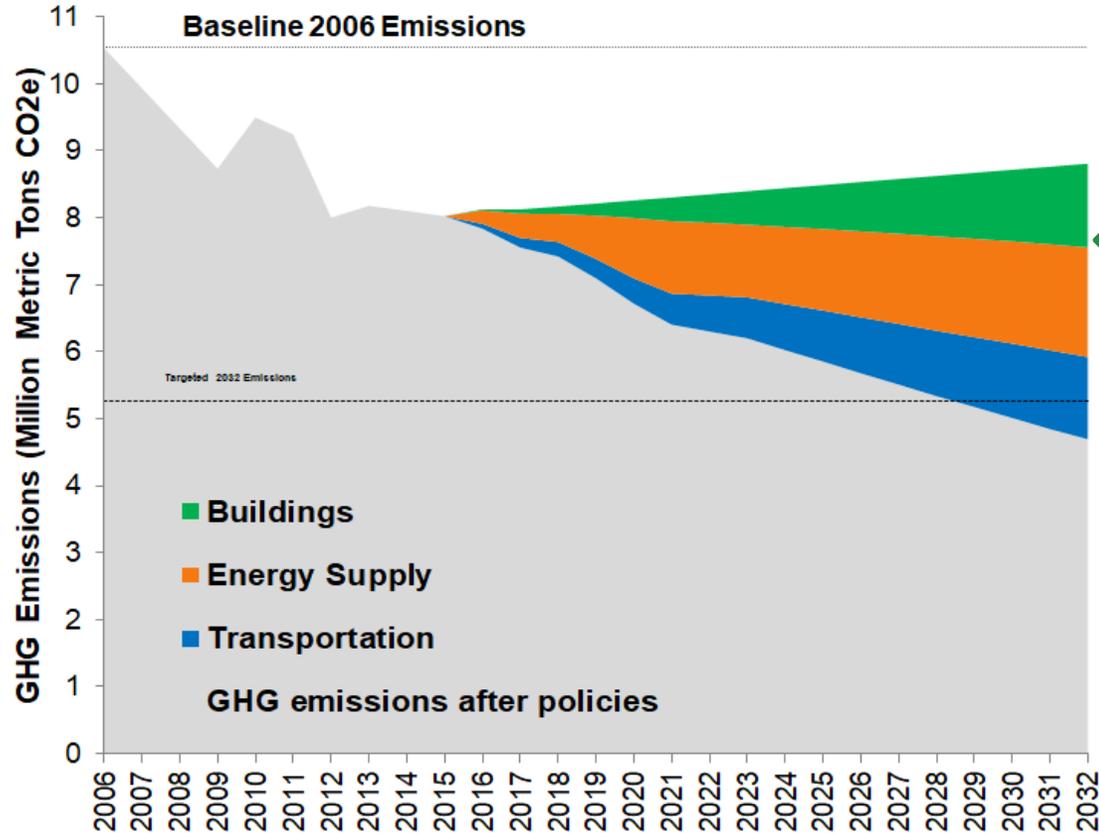
RELATIVE IMPACT OF ACTION AREAS



CLEAN ENERGY DC PLAN



ESTIMATED GHG SAVINGS: 56%



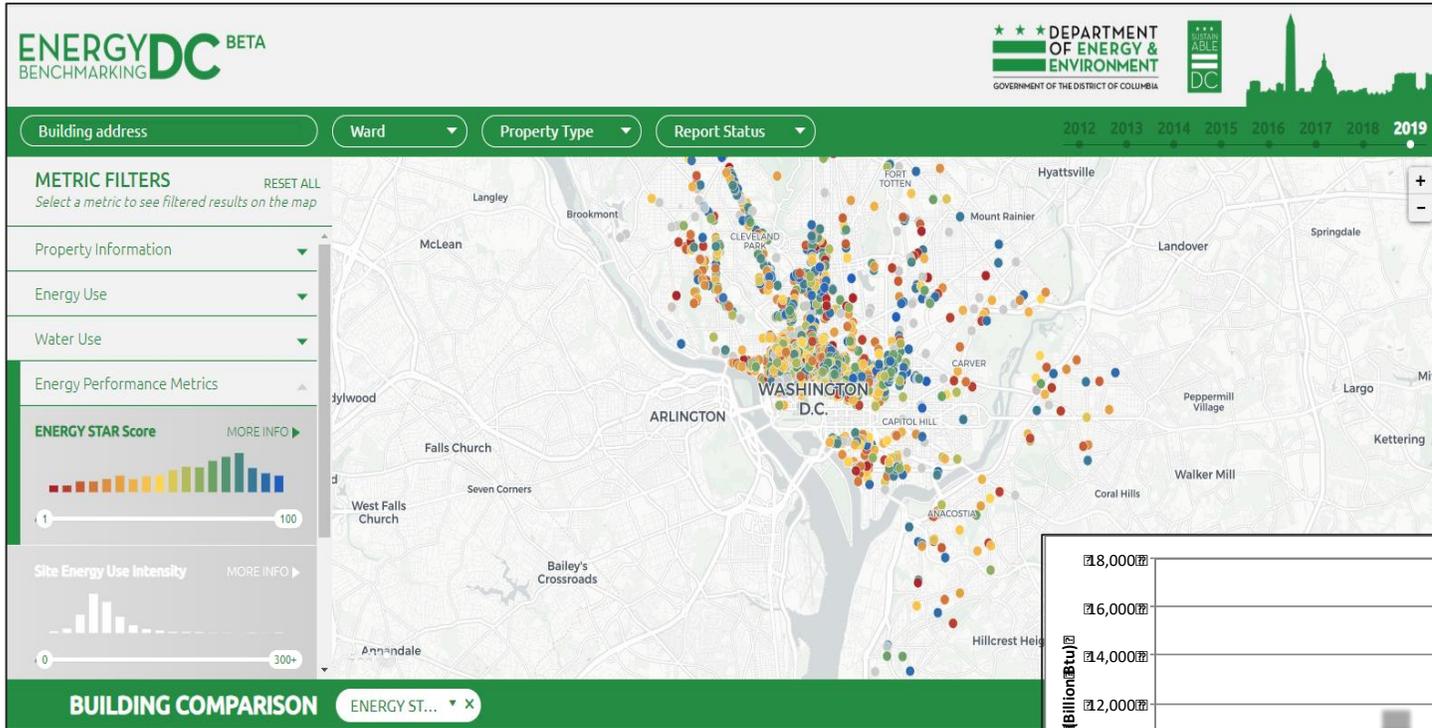
BEPS ENERGY REDUCTION GOALS

21% reduction in source energy if all buildings meet the standard for their type and size subgroup.

- 18.7% from buildings over 50K sf
- 1.4% from 25K-50K sf buildings
- 1% from 10K-25K sf buildings

**ANNUAL GHG EMISSIONS SAVINGS:
1.05 MILLION TONS OF CO2e**

DATA: ACCESS & ANALYSIS

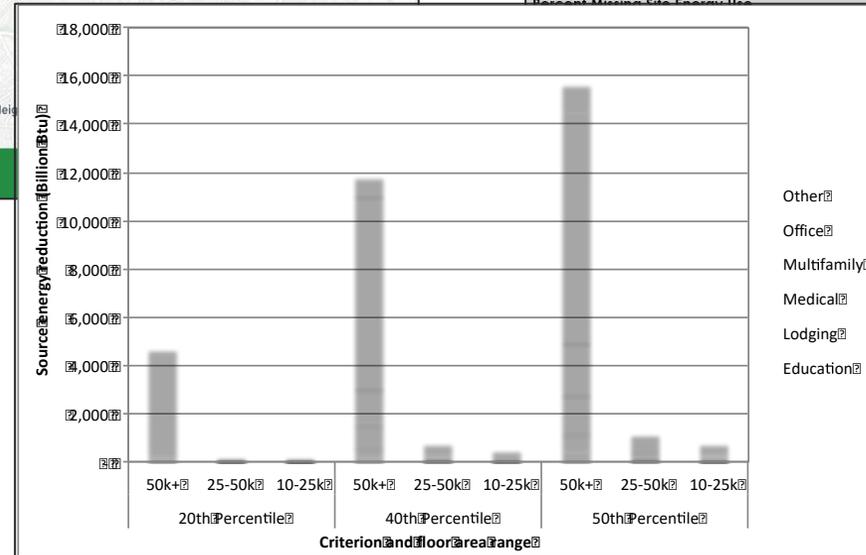


www.energybenchmarkingdc.org

Table A.2: Summary of building energy use

	Site Energy Use Intensities (EUI) in 2015 (kBtu/ft2)				Estimated Site Energy consumption in 2015 (million kBtu)			
	Total	Electricity	Natural Gas	Fuel Oil	Total	Electricity	Natural Gas	Fuel Oil
Residential					23,742	7,773	14,769	1,200
Low-rise residential (1-4 units)	48.6	9	35	4.6	9,064	1,679	6,529	856
Multifamily (5+ units)	85.5	35.5	48	2	14,678	6,094	8,240	343
Institutional and Government					16,079	9,570	6,435	73
Education and Other Inst'l (non-gov)	101.4	60	41	0.4	3,206	1,897	1,296	13
Federal Government	108.5	64	44	0.5	8,832	5,210	3,582	41
District Government	103.4	64	39	0.4	3,073	1,902	1,159	12
Embassy	109.4	63.5	45	0.9	967	561	398	8
Commercial and Industrial					24,256	17,844	6,134	279
Office	88.9	75.5	12.5	0.9	15,256	12,954	2,145	157
Hotel	103	57.5	45	0.5	2,425	1,354	1,059	12
Other Comm. and Industrial	110.9	53	56	1.9	5,264	2,516	2,658	90
Hospital and Other Medical	198.1	154.1	41	3	1,311	1,020	271	20
Facilities Excluded from Analyses*					1,262	700	562	0
DC Water	n/a	n/a	n/a	n/a	762	700	62	0
GSA Central Heating Plant	n/a	n/a	n/a	n/a	500	n/a	500**	0
Total					65,711	36,121	28,039	1,552
Total Site Energy Use from DOEE					65,820	36,147	28,120	1,552
Total Missing Site Energy Use					480	281	220	0
Percent Missing Site Energy Use					0.70%	0.70%	0.80%	0.00%

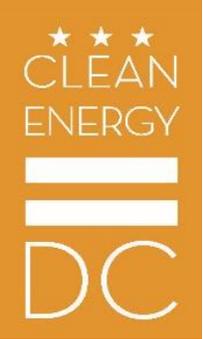
*The Plan assumes building actions do not affect their performance. **Natural gas consumed in the process of generating steam for Federal Government captured by these buildings' energy consumption.



C40 Technical Analysis

Clean Energy DC Analysis

- Other
- Office
- Multifamily
- Medical
- Lodging
- Education



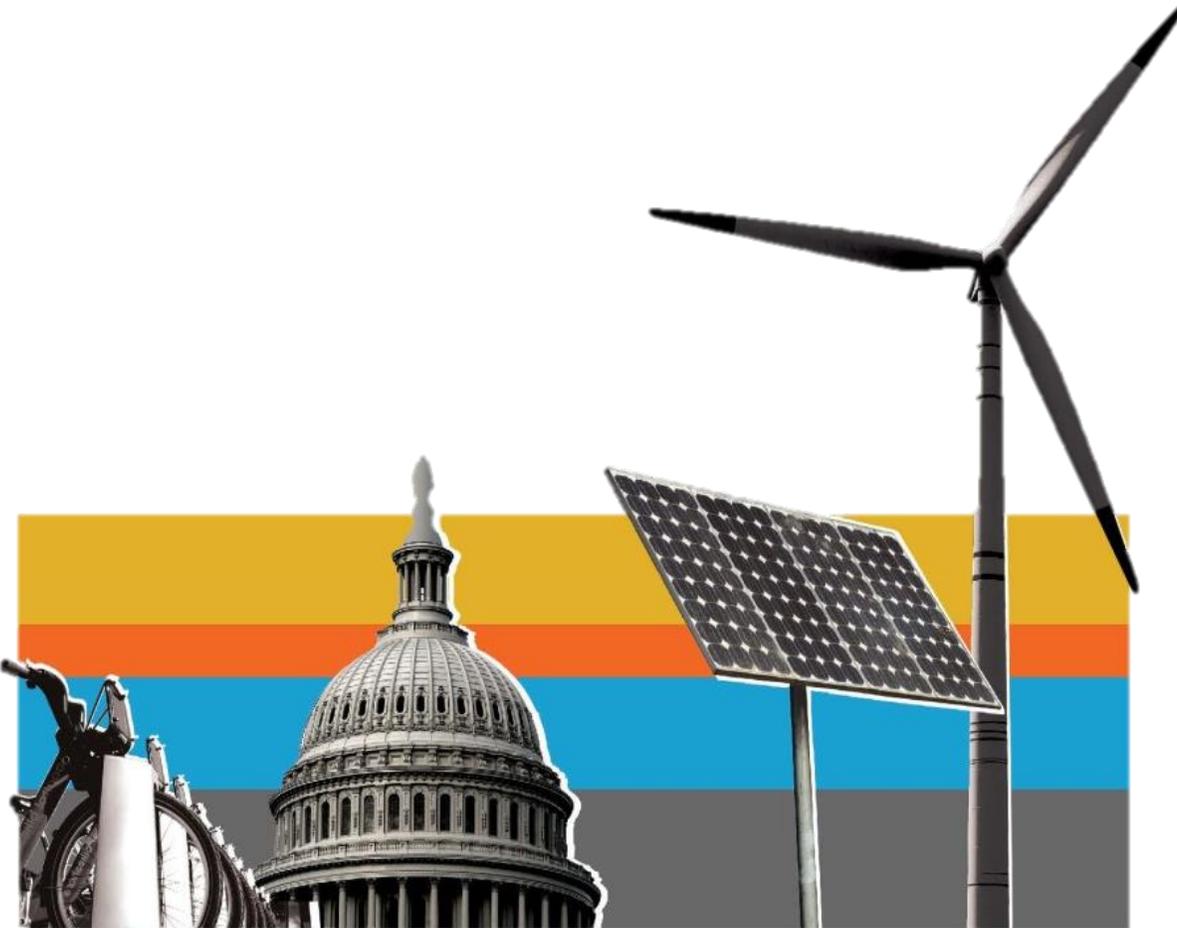
CLEAN ENERGY DC OMNIBUS AMENDMENT ACT OF 2018, TITLE III...

BENCHMARKING

Lowers minimum building square footage required to benchmark; Creates data verification requirements

ENERGY PERFORMANCE

Improves the performance of existing buildings by implementing a **Building Energy Performance Standard**



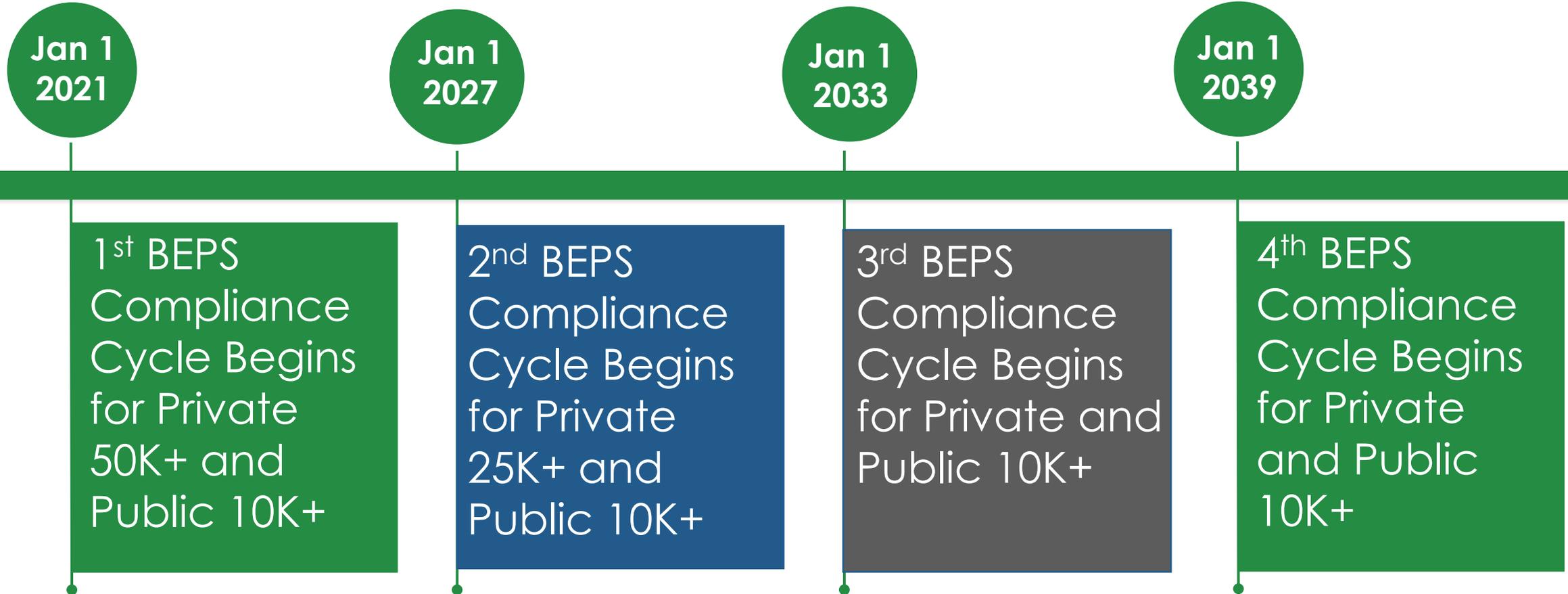
BUILDING ENERGY PERFORMANCE STANDARD

- ❑ DOEE must establish a minimum threshold for energy performance - will be “no lower than” the local median ENERGY STAR score by property type (or equivalent metric)
- ❑ Buildings that do not meet the minimum threshold for energy performance enter a 5-year compliance cycle - 1st cycle begins January 2021
- ❑ Compliance paths for bldgs. that do not meet the minimum:
 - ❑ Performance: Reduce energy usage 20%
 - ❑ Prescriptive: Implement cost-effective efficiency measures
 - ❑ Other paths as determined by DOEE
- ❑ Creation of BEPS Task Force

More than 2,700 buildings impacted by BEPS!

- **916 buildings over 50k sf**
- **561 buildings 25-50k sf**
- **1,269 buildings 10-25k sf**

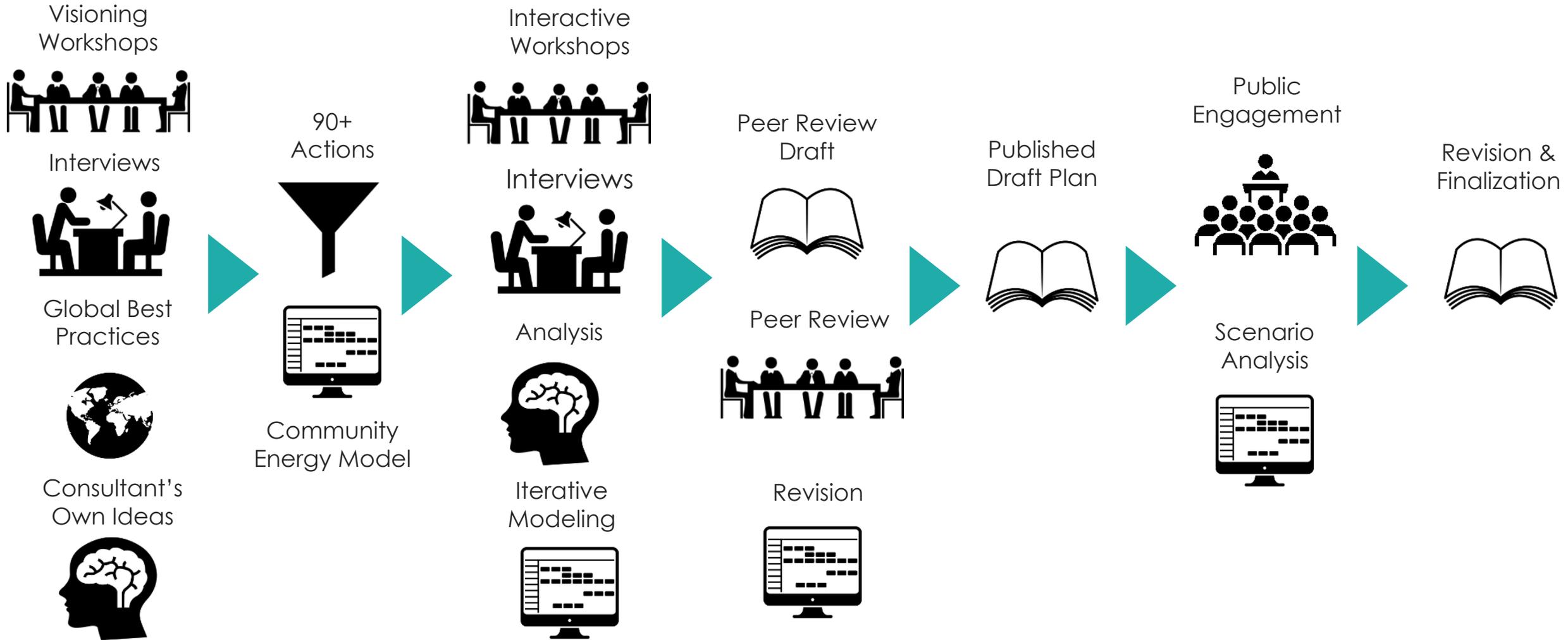
BEPS APPLICABILITY TIMELINE



*Standards are set every 6 years (with 1+yr adjustment for COVID in Period 1)



STAKEHOLDER ENGAGEMENT: CLEAN ENERGY DC



BEPSDC WORKING GROUPS

Kickoff event – June 2019



Presentations/remarks:
DOEE Director
Commercial building rep
Industry associations



Live polling to understand topics most important to stakeholders



Tabling for key partners involved in energy efficiency assistance/incentives

BEPSDC WORKING GROUPS

- **4 Working Group Sessions (June – September) :**
 - Financing
 - Program Structure
 - Technical Assistance
 - Energy Efficiency Strategies
- **139 Attendees**
- **Wide variety of industries represented:**
 - Associations
 - Commercial & Multifamily Property Managers
 - Construction Companies
 - Architects
 - Engineers
 - Energy Consultants
 - Facility Managers
 - Information Technology Professionals
 - Non-profit Advocates
 - Real Estate Developers
 - Universities
 - Utility Companies

Slides + Notes from each session posted to DOEE website:

<https://doee.dc.gov/node/1436881>

BEPSDC WORKING GROUPS

- **Affordable Housing Working Group (Aug – Sept 2019)**
 - Convened by National Housing Trust (NHT) and Housing Association of Nonprofit Developers (HAND)
 - Sessions focused on:
 - Financing/technical assistance
 - Program Structure/Implementation
 - Final Report delivered **November 2019**



SCORECARDS ISSUED FOR THE FIRST TIME IN 2019

To request scorecard data
for multiple buildings,
email
info.benchmark@dc.gov



[PROPERTY NAME]

[PROPERTY ADDRESS]

Gross Square Feet: [PROPERTY GFA]

Portfolio Manager ID: [PM ID]

[PROPERTY TYPE]

Thank you for benchmarking your building's energy use in 2018. Share this scorecard with your property's decision-makers to understand more about your building's past performance and comparison to similar [PROPERTY TYPE] buildings in Washington, DC. Program offerings from the DC Sustainable Energy Utility (DCSEU) are detailed below to help you improve your building's performance and decrease operating costs.



ENERGY STAR score is a normalized 1-100 scale of a building's energy performance against a national dataset of similar buildings, where higher scores signify better energy performance

When comparing your building's 2018 ENERGY STAR score with similar buildings in the District, your building is currently ranked [RNK] out of [TOT].

[RNK]/[TOT]

From 2017 to 2018, your building's Energy Use Intensity (energy usage per square foot) has decreased by [EUI]%

↓ [EUI]%

Save [\$SAVINGS] if you improve your building's performance by 20%

save [\$ SAVINGS]

Kudos! Your property is ranked in the upper half of [PROPERTY TYPE] buildings in the District, and your energy use intensity decreased from 2017 to 2018. Call DCSEU at the number below to get tips on continuous improvement and ensure that your property stays above the upcoming Building Energy Performance Standards (read more at doee.dc.gov/service/beps).

BEPSDC Task Force



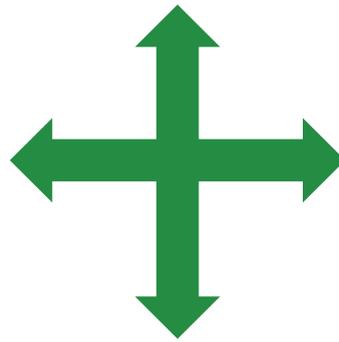
Agenda, slides, notes: <https://doee.dc.gov/service/building-energy-performance-standards>

ALIGNMENT: ASSISTANCE, INCENTIVE, FINANCING



DC
SUSTAINABLE ENERGY
UTILITY

HIGH-PERFORMANCE
BUILDING HUB



CLEAN ENERGY DC ACT: NEW PROGRAMS & FUNDING

Increased revenue & expanded uses for the **Sustainable Energy Trust Fund**:
\$20-22 million in Fiscal Years 2020-2022

- \$70 million over 6 years to **DC Green Bank**
- \$3 million beginning in FY2022 to support **affordable housing compliance with BEPS**
- 30% of the increase (~\$7million) in SETF to **benefit low-income residents**; support workforce development initiatives and the Sustainable Energy Infrastructure Capacity Building & Pipeline program

Allows gas and electric utilities to apply to PSC to offer energy efficiency and demand reduction programs



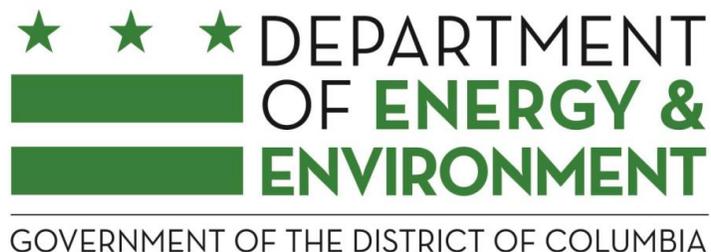
THANK YOU!

David Epley

Associate Director, Data & Benchmarking Division

doee.dc.gov/energybenchmarking or doee.dc.gov/service/beps

David.Epley@dc.gov



Q & A

Submit Questions
www.slido.com event code **#DOE**



Rajiv Ravulapati

Government Services Analyst – Building Division
City of St. Louis, Missouri

Submit Questions
www.slido.com event code **#DOE**

St. Louis Tackles Carbon from Existing Buildings



**The Midwest's First Building
Performance Standard**

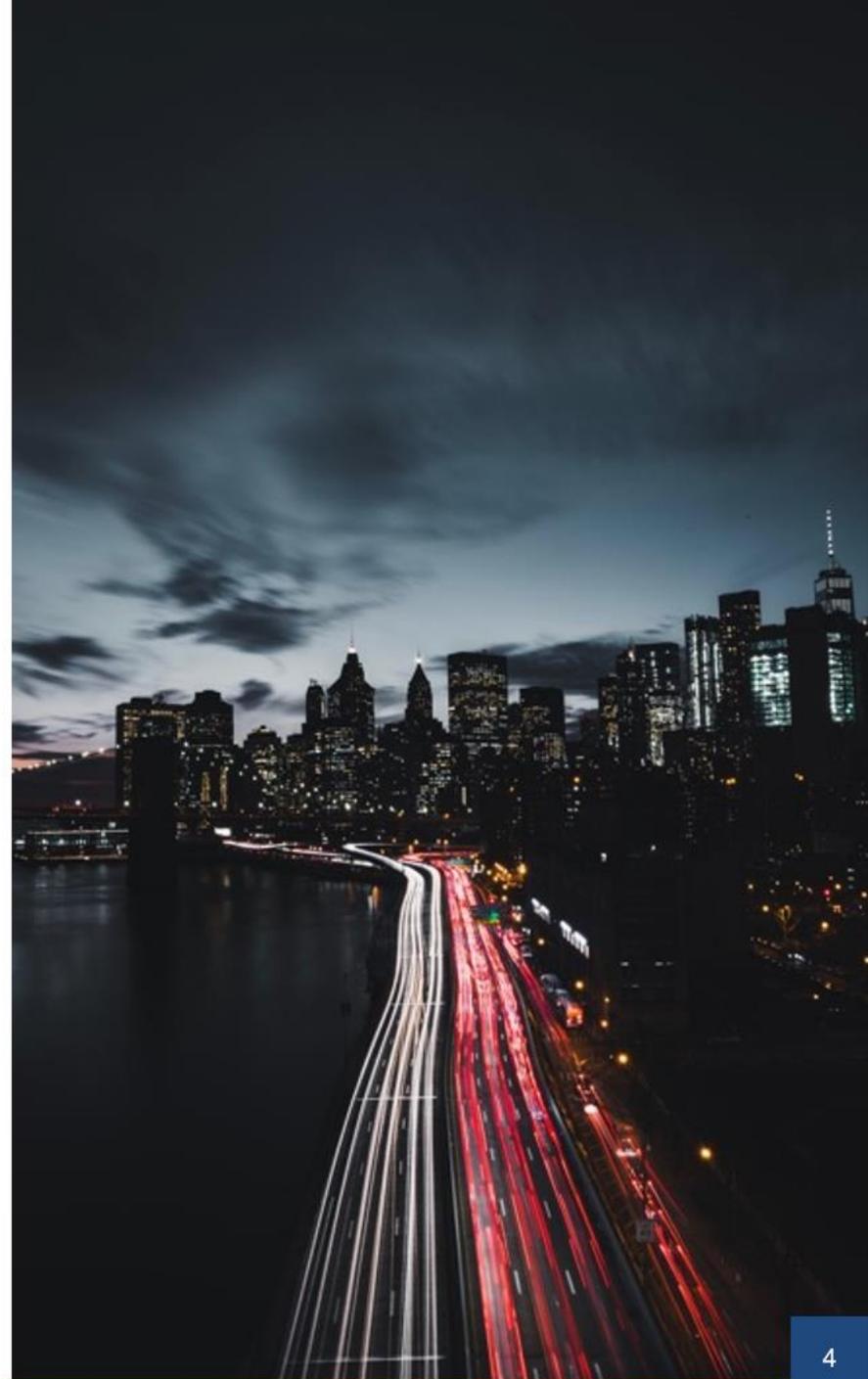


Why We Led on BEPS & Why It's Right for St. Louis

- Quite honestly, it's the right thing to do given how indiscriminate the effects of climate change are, especially here in St. Louis and the Midwest in general.
- It's important for all functions of government to lead on policies that can benefit the health and welfare of citizens.
- Our BEPS policy has big time potential public health and economic benefits to St. Louis, particularly for many of the local building trade organizations
- Buildings account for 80% of our GHG emissions – BEPS is by far the most impactful legislation we have passed to address this problem

Why We Led on BEPS & Why It's Right for St. Louis

- Building codes + BEPS
 - as codes continue to recognize the importance of minimum safety, they also move towards progressive measures and cities' sustainability goals
 - I see this intersectionality as a natural progression towards better indoor air quality in our buildings, enhanced operations + maintenance, and retention of people/businesses in buildings
 - simply put, it reinforces our board community goals as a City wanting to lead on building energy efficiency



BEPS Design Decisions

Performance
Metric

Covered
Buildings

Exemptions

Compliance
Cycles

Improvement
Requirements

Equity



BEPS Design Decisions: Performance Metric

SITE Energy Use Intensity (EUI)

Simplicity

Owner-Control

Drive Electrification

BEPS Design Decisions

- **Covered buildings:** 50,000 ft²
- **Exemptions:** Same @ Benchmarking Policy
- **Compliance Cycle:** Comply first in May 2021 and every four years after
- **Improvement Requirements:** Not included, but can be used as alternative compliance path if presented to Building Energy Improvement Board





BEPS Design Decisions: Equity

- Extended compliance cycle for affordable housing and houses of worship from 4 to 6 years
- Building Energy Improvement Board and coming Energy Resource Hub available to assist under-resourced buildings with compliance
- Gas and Electric utilities have generous incentives for affordable housing that are co-delivered

Community & Stakeholder Engagement Timeline





SUPPORTERS INCLUDE:



Good for the Economy.
Good for the Environment.



Missouri
State Emblem
Power & Light



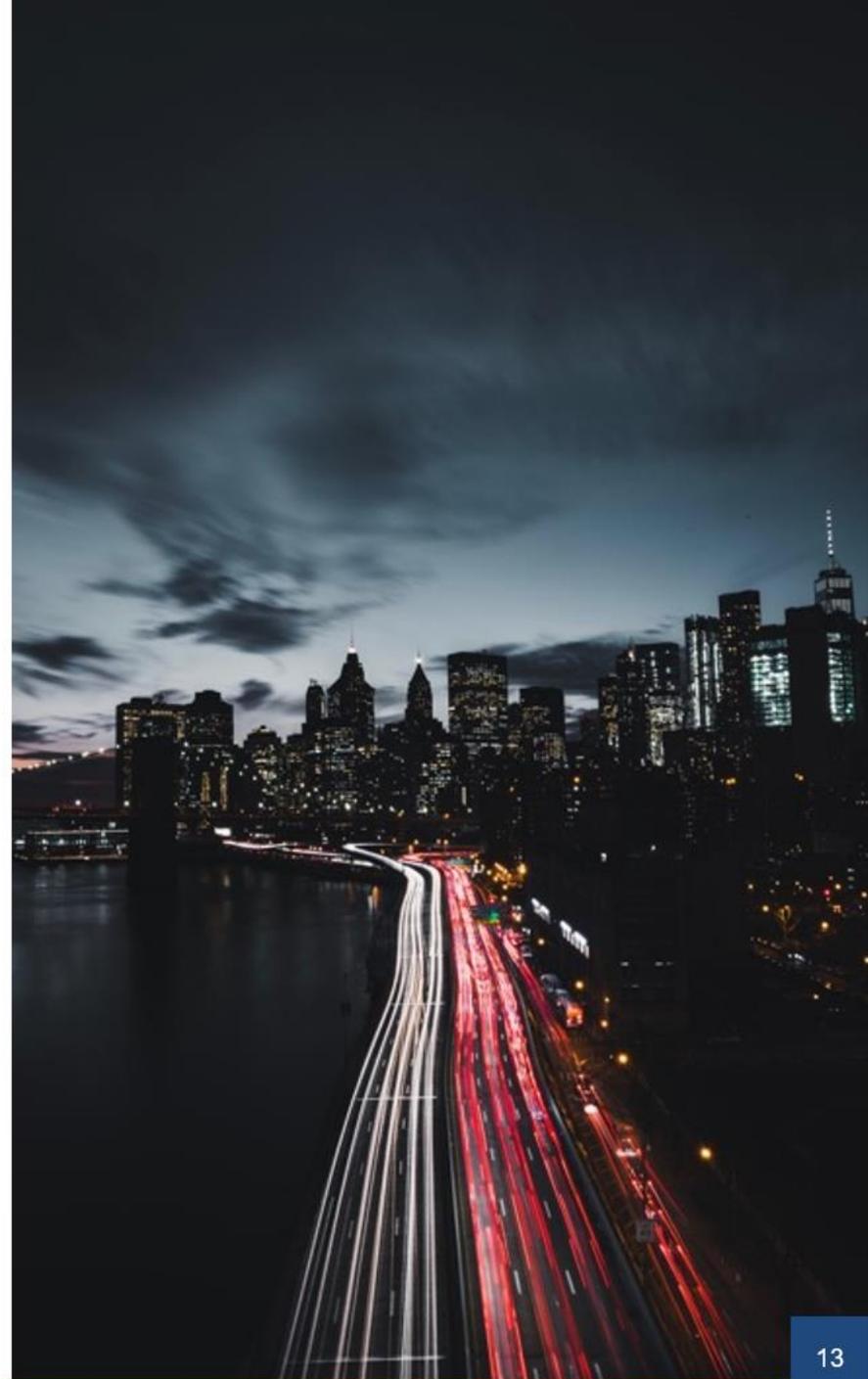
Building Energy Improvement Board (BEIB)

- Defining element of policy
- Harness local private sector expertise
- Democratically approve equitable accommodations
- 9 member board appointed by the Mayor
- Equity win that was supported by local stakeholders



Role of Building Energy Improvement Board

- Establish & approve standards each compliance cycle
- Review and recommend amendments to proposed regulations
- Review alternative compliance plans - recommendation approval or denial
- Recommend complementary programs and technical expertise
 - Plan to create technical sub-committee to support board



Keys to Success & Lessons Learned



- The right staff who can build a coalition & manage the process
- Outside partners to advocate on the City's behalf & to key stakeholders, like utilities or real estate



- Getting local elected officials to be part of planning process & show buy-in/leadership
- Benchmarking Advisory Group: convening stakeholders for over a year to help guide the policy design



- Have an operating department oversee policy creation & implementation after policy passage
- IMT's & ACCC – technical expertise and organizing efforts

St. Louis got lucky, in some respects



- We are an ACCC-funded city, we were lucky enough to have technical support and resources at our disposal.
- When COVID-19 lockdowns began, we had our ordinance language + proposed budget completed AND submitted to our Board of Aldermen.

Photo courtesy of Hope Gribble



- Main sponsor pushed BEPS through the legislative process even while COVID-19 disrupted normal board procedures. **BEPS passed unanimously!**
- We had ZERO testimony opposing BEPS during committee or to any alderpeople

Photo courtesy of Richard Reilly

What's Next?

- Building Division reviewing board applicants to make nominations for the Mayor to appoint
 - Applications will be accepted through end of this week
- Building Division is currently working with Washington University on analyzing local benchmarking data to establish standards by property type
 - Standards will then be recommended to the Board to review and finalize
- The Office of Building Performance shall be established to oversee the implementation, compliance and enforcement of both the existing benchmarking ordinance and BEPS
- ***All these next steps must be completed by May 4th, 2021***

Rajiv Ravulapati – City of St. Louis

Government Services Analyst

314-622-3616

ravulapatir@stlouis-mo.gov

Q & A

Submit Questions
www.slido.com event code **#DOE**

Department of Energy Resources

Benchmarking and Transparency: Resources for State and Local Leaders

This resource guide provides state and local leaders with streamlined access to key existing resources for developing and implementing high-impact building energy benchmarking and transparency programs in their jurisdictions.

Better Buildings
U.S. DEPARTMENT OF ENERGY

Benchmarking and Transparency: Resources for State and Local Leaders

This resource guide provides state and local leaders with streamlined access to key existing resources for developing and implementing high-impact building energy benchmarking and transparency programs in their jurisdictions.

Overview
Buildings account for roughly 40% of the energy consumed in the United States.¹ Recognizing the tremendous opportunity for energy and cost savings and associated health and environmental benefits, state and local leaders are advancing building energy benchmarking and transparency programs to support improved efficiency.

Benchmarking and transparency means measuring a building's energy use and then comparing it to the energy use of similar buildings, its own historical energy usage, or a reference performance level (e.g., based on a building energy code).

FIGURE 1: U.S. Building Energy Benchmarking and Transparency Policies

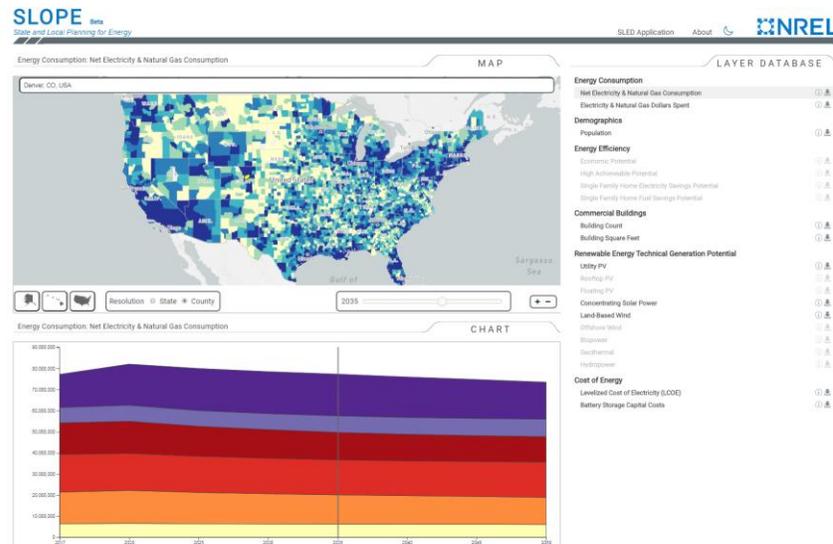
Learn more at betterbuildingsolutioncenter.energy.gov

U.S. DEPARTMENT OF ENERGY

State and Local Planning for Energy (SLOPE) Platform

A DOE-led collaboration across 8 EERE technology offices and NREL to create a **dynamic, comprehensive energy planning platform**

of integrated, localized data for state and local decision makers.



Energy Data Access: Blueprint for Action Toolkit

This toolkit summarizes opportunities for states and local governments to streamline their process for getting access to data and building performance information.

TOOLS

Better Buildings Energy Data Accelerator Key Accomplishments and Results Fact Sheet
Key accomplishments and results of partners are outlined in this fact sheet, profiling the historic expansion of data accessibility and increases in building energy benchmarking.

Best Practices for Providing Whole-Building Energy Data: Guide for Utilities Guidance
This document presents best practices for utilities to develop whole-building data access systems, based on the experiences of leading utilities from across the country.

ComEd Utility Best Practices Case Study - ComEd Case Study
ComEd was the first utility in the country to provide aggregate whole-building data to commercial building customers for the express purpose of enabling energy performance benchmarking.

EVERSOURCE Utility Best Practices Case Study - Eversource Case Study
The City of Boston and Eversource worked collaboratively to develop a data access solution. Starting with a Memorandum of Understanding to clearly define the goal of providing whole-building data access to commercial building owners, Eversource also provided a dedicated staff member to interface with the city, and to ensure that the data access solution supported compliance with the city's benchmarking ordinance.

Stakeholder Engagement Strategy Guide Guidance
This document provides guidance on designing productive stakeholder engagement and outreach to support the development of whole-building data access solutions.

Additional Resources

- City of Seattle – Building Tune-Up Accelerator Final Report and Case Studies
 - <http://www.seattle.gov/environment/climate-change/buildings-and-energy/building-tune-ups/tune-up-accelerator>
- Institute for Market Transformation – Exploring Building Performance Standards
 - <https://www.imt.org/how-we-drive-demand/building-policies-and-programs/exploring-building-performance-standards/>
- Urban Land Institute – Decarbonizing the Built Environment: 10 Principles for Climate Mitigation Policies
 - www.uli.org/decarbonizing10ps



E-Learning Center

Discover online training and education opportunities from the U.S. Department of Energy (DOE) and Better Buildings Affiliates who are working with DOE to promote energy efficiency in U.S. buildings and manufacturing plants.

Learn more at: <https://betterbuildingsolutioncenter.energy.gov/e-learning-center>

“Proving Ground – Public Sector Field Validation” Funding Opportunity Announcement (FOA)

Building Technologies Office

- **Concept papers due July 27, 2020**
- **Full applications due September 28, 2020**

- **FOA released on June 26, 2020**
- An informational FOA webinar was held on June 30, 2020
- Up to **\$10 million** in funding available
- **Awards can be up to \$1 million**
- Purpose: to generate and disseminate data on the field performance of novel approaches to integrate advanced building technologies, which can inform commercial and multi-family building efficiency, demand flexibility, and building-to-grid programs
- Eligible entities include:
 - State, local, and tribal governments
 - States with high energy consumption per capita
- Visit eere-exchange.energy.gov for more information on FOA (**DE-FOA-0002324**)

EERE Funding Opportunities

Visit <https://eere-exchange.energy.gov/> and <https://grants.gov> for more funding information

“Connected Communities” Funding Opportunity (Coming Soon)

Building Technologies Office

- DOE **intends to invest up to \$42 million** into “Connected Communities”
- Funding Opportunity Announcement is expected to be released later in **2020**
- Purpose: to enable and study groups of grid-interactive efficient buildings that increase grid reliability and reduce emissions while maintaining or enhancing occupant satisfaction
- Visit eere-exchange.energy.gov for more information on the notice of intent (**DE-FOA-0002249**)
- Start forming a team of strategic stakeholders for submission
- Teaming List email CCPilotsTeamingList@hq.doe.gov



Connected Community:

A group of grid-interactive efficient buildings (GEBs) with diverse, flexible end-use equipment that collectively work to maximize building and grid efficiency without compromising occupant needs and comfort

Better Buildings: Summer Webinar Series



**BEHIND THE METER
DISTRIBUTED ENERGY
RESOURCES:**
BEST PRACTICES FOR INTEGRATING
DERS INTO COMMERCIAL BUILDINGS

July 8



**NEXT-GENERATION BUILDING
PERFORMANCE POLICIES:**
MAXIMIZING ENERGY SAVINGS AND
ENVIRONMENTAL IMPACTS

July 16



**EVERYONE HAS A
DATA CENTER:**
HOW TO BE AN ENERGY
CHAMPION FOR YOURS

July 28

[REGISTER TODAY >](#)



**PROGRAM DESIGN WITH
EVERYONE IN MIND:**
LOW-INCOME SOLAR
PROGRAM STRATEGIES

July 9



**STRATEGIES TO COMBINE
ENERGY + HEALTH UPGRADES
IN MULTIFAMILY HOUSING**

July 21

[REGISTER TODAY >](#)



**SUCCEED WITH
SUBMETERING:**
HOW TO MAKE THE BUSINESS CASE

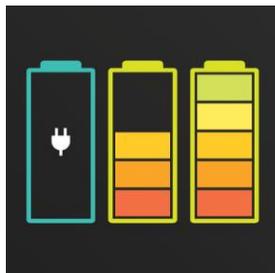
August 4

[REGISTER TODAY >](#)



THE DYNAMIC DUO:
UNLEASH PUBLIC SECTOR ENERGY
SAVINGS WITH FINANCING AND
TECHNICAL ASSISTANCE

July 14



CASE IN POINT:
OREGON'S RECENT EFFORTS TO
REDUCE PLUG LOAD ENERGY
CONSUMPTION

July 22

[REGISTER TODAY >](#)





STRATEGIES TO COMBINE ENERGY + HEALTH UPGRADES IN MULTIFAMILY HOUSING

Tuesday, July 21, 2020 | 1:00 - 2:30 PM ET

[REGISTER TODAY >](#)

This interactive webinar will provide an opportunity for speakers and attendees to share their strategies for combining energy and health upgrades to help promote health and wellness for residents of multifamily buildings. Panelists will present case studies of innovative partnerships between affordable housing providers, public health, and building science stakeholders to advance energy + health initiatives and will share experiences pursuing the FitWel® certification for healthy buildings.

SOLUTIONS PROGRAMS & PARTNERS EVENTS & WEBINARS LEARN MORE

EXPLORE BY TOPIC ▾ BROWSE SOLUTION TYPES ▾ TOOLKITS ▾ FINANCING NAVIGATOR RESILIENCE CHP ▾



JUNE 8-11 2020 SUMMIT
A Virtual Leadership Symposium
2020 Summit Sessions Are Now Available Online - Watch Today!

BETTER BUILDINGS

Better Buildings is an initiative of the U.S. Department of Energy (DOE) designed to improve the lives of the American people by driving leadership in energy innovation. Through Better Buildings, DOE partners with leaders in the public and private sectors to make the nation's homes, commercial buildings and industrial plants more energy efficient by accelerating investment and sharing of successful best practices.

Stay connected and informed: [subscribe here](#).



Stay Connected

State and Local Solution Center

More than **400** tools, resources, and best practices

State and Local Spotlight

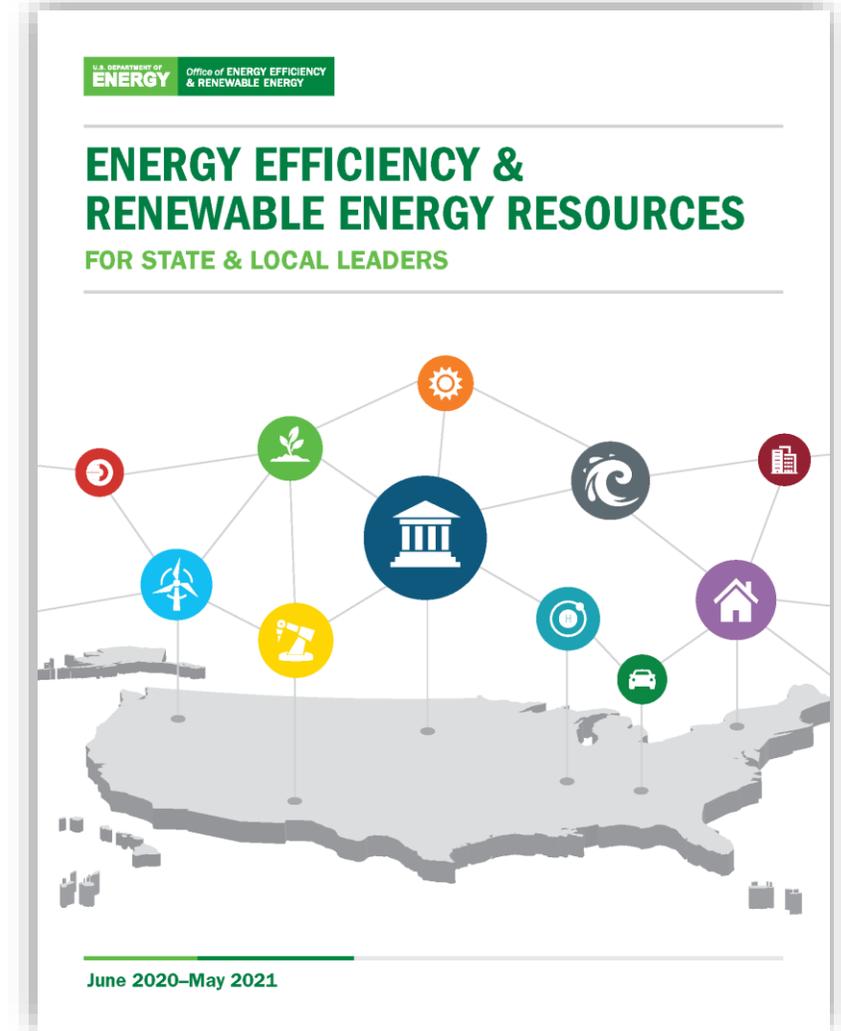
Monthly newsletter with ~**32,000** subscribers

Subscribe:

<http://energy.gov/eere/slsc>

Contact WIP:

stateandlocal@ee.doe.gov



<https://www.energy.gov/eere/slsc/downloads/energy-efficiency-and-renewable-energy-resources-state-and-local-leaders-june>

On a scale of 1 to 5, how would you rate this webinar?

(1= missed the mark, 3 = average, 5= fantastic)

Please go to www.slido.com and enter code #DOE to respond

Additional Questions?

Please Contact Us



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[@BetterBldgsDOE](#)



Better Buildings Solution Center
<https://betterbuildingsolutioncenter.energy.gov/>



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