Better Communities®
U.S. DEPARTMENT OF ENERGY

U.S. Department of Energy Resources for Local Leaders

Agatha Wein & Sapna Gheewala

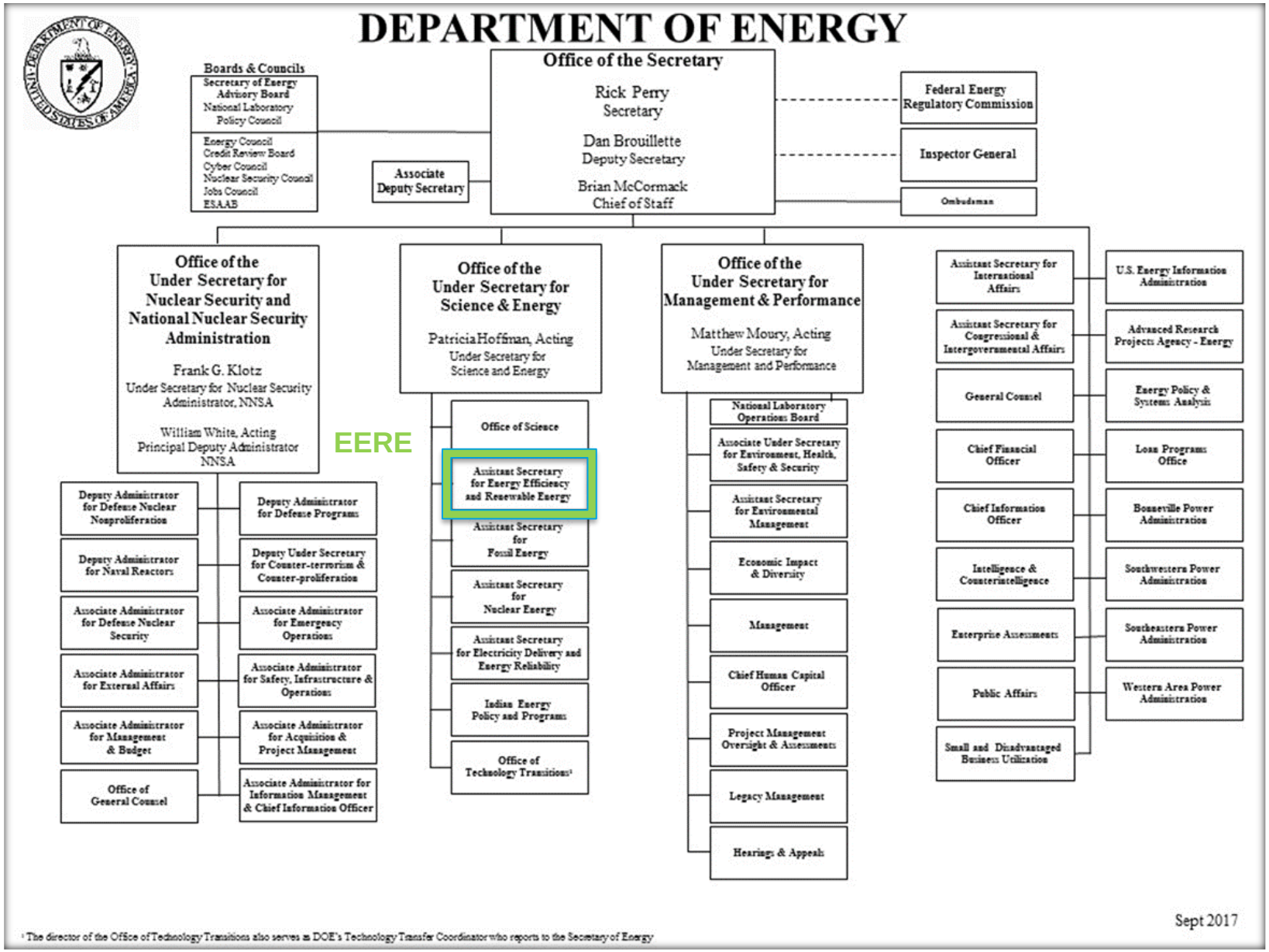
Weatherization & Intergovernmental Programs Office (WIP)

October 2017

U.S. DEPARTMENT OF ENERGY

Overview

- Who we are (10 min – Agatha)
  - DOE > EERE > WIP > P&TA
  - Better Communities Alliance (BCA)
- Energy Planning: Steps and Barriers (20 min – Sapna)
- Data Access & Tool Demo (20 min – Agatha)
- Finance Options & Case Studies (20 min – Agatha)



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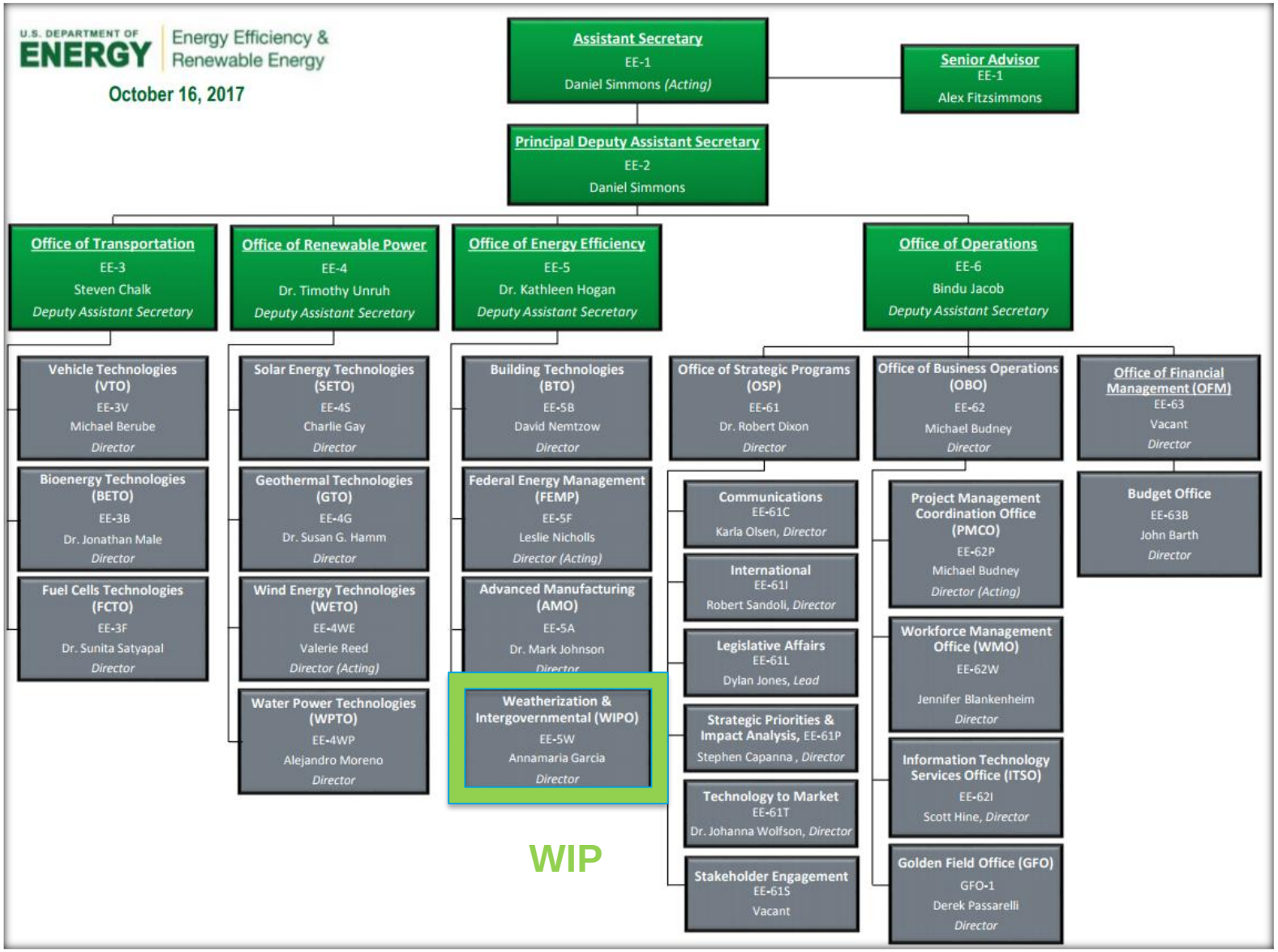
U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy
October 16, 2017
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Daniel Simmons (Acting)
Senior Advisor
EE-1
Alex Fitzsimmons
Principal Deputy Assistant Secretary
EE-2
Daniel Simmons
Office of Transportation
EE-3
Steven Chalk
Deputy Assistant Secretary
Office of Renewable Power
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Dr. Timothy Unruh
Deputy Assistant Secretary
Office of Energy Efficiency
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Valerie Reed
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Karla Olsen, Director
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Robert Sandoli, Director
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Stephen Capanna , Director
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Vacant
Office of Business Operations (OBO)
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Workforce Management Office (WMO)
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Information Technology Services Office (ITSO)
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Scott Hine, Director
Golden Field Office (GFO)
GFO-1
Derek Passarelli
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Office of Financial Management (OFM)
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Director
Budget Office
EE-63B
John Barth
Director
WIP

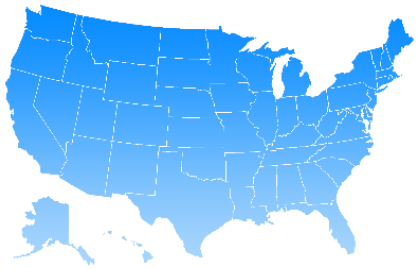
Weatherization & Intergovernmental Programs Office (WIP)

•WIP is part of EERE's "all of the above" national energy strategy to create **greater energy affordability, security and resiliency.**

•WIP's mission is to **enable strategic investments** in energy efficiency and renewable energy technologies and **innovative practices across the U.S.** by a wide range of government, community and business stakeholders, in **partnership with state and local organizations**.

•WIP supports DOE's strategic objective **to lower energy costs** while **expanding energy choices** for all American communities.

State Energy Program



Weatherization Assistance Program

Partnerships and Technical Assistance

Strategic & Interagency Initiatives

Better Communities Alliance (BCA)

Delivering **integrated, community-scale support** that enables local governments to achieve their energy, economic and infrastructure goals, and replicate solutions.

Partners include 44 local governments from more than 20 states and 31 affiliate organizations, including NGOs, foundations, for-profit businesses, and local government networks

https://betterbuildingsinitiative.energy.gov/bca

DOE Initiatives and Support for Local Governments

Better Buildings® U.S. DEPARTMENT OF ENERGY

SEED STANDARD ENERGY EFFICIENCY DATA PLATFORM™ U.S. DEPARTMENT OF ENERGY

Cities-LEAP

SOLSMART NATIONALLY DISTINGUISHED. LOCALLY POWERED.

SOLAR in Your Community CHALLENGE

Clean Cities U. S. Department of Energy

U.S. DEPARTMENT OF ENERGY SMARTMOBILITY Systems and Modeling for Accelerated Research in Transportation

The State & Local Solutions Center

https://energy.gov/EERE/SLSC

Develop an Energy Plan

- Local Energy Planning
- State Energy Planning

Design and Implement Energy Programs

- Low-Income Communities
- Wastewater Infrastructure
- Outdoor Lighting
- Energy Efficiency for K-12 Schools
- Public-Private Partnerships

Pay for Energy Infrastructure

- EE Finance 101
- ESPCs, QECBs, PACE, RLFs

Access and Use Energy Data

- Benchmarking
- Data Disclosure & Transparency
- Evaluation, Measurement, & Verification (EM&V)

AVAILABLE NOW:

- Energy Efficiency & Renewable Energy Resources for State & Local Leaders
- State Planning for VW Settlement Funds: Quick Reference Guide on Stakeholder Engagement
- Qualified Energy Conservation Bonds (QECBs): Frequently Asked Questions from State and Local Governments
- Best Practice Guidelines for Residential PACE Financing Programs
- Leveraging Federal Renewable Energy Tax Credits

COMING SOON:

- **Electricity Burden** Fact Sheet: Rates vs. Bills vs. Electricity Burden
- **Energy Savings Performance Contracting** (ESPC) Fact Sheet
- **Commercial Property Assessed Clean Energy** (PACE) Fact Sheet
- Lessons in **Commercial PACE** Leadership: The Path from Legislation to Program Launch
- **Energy Data Management Guide**
- BBC **Showcase Project** from New York

Technical Assistance Toolkits

Energy Savings Performance Contracts

- ✓ *Catalyzed $2.1B in public sector energy efficiency investments via ESPC from 25 partners*
- ✓ *ESPC Toolkit includes:*
  - ESPC Virtual Assistant
  - ESPC Champions Toolkit
  - ESPC Networking Toolkit
  - ESPC or Design-Bid-Build Comparison

Outdoor Lighting

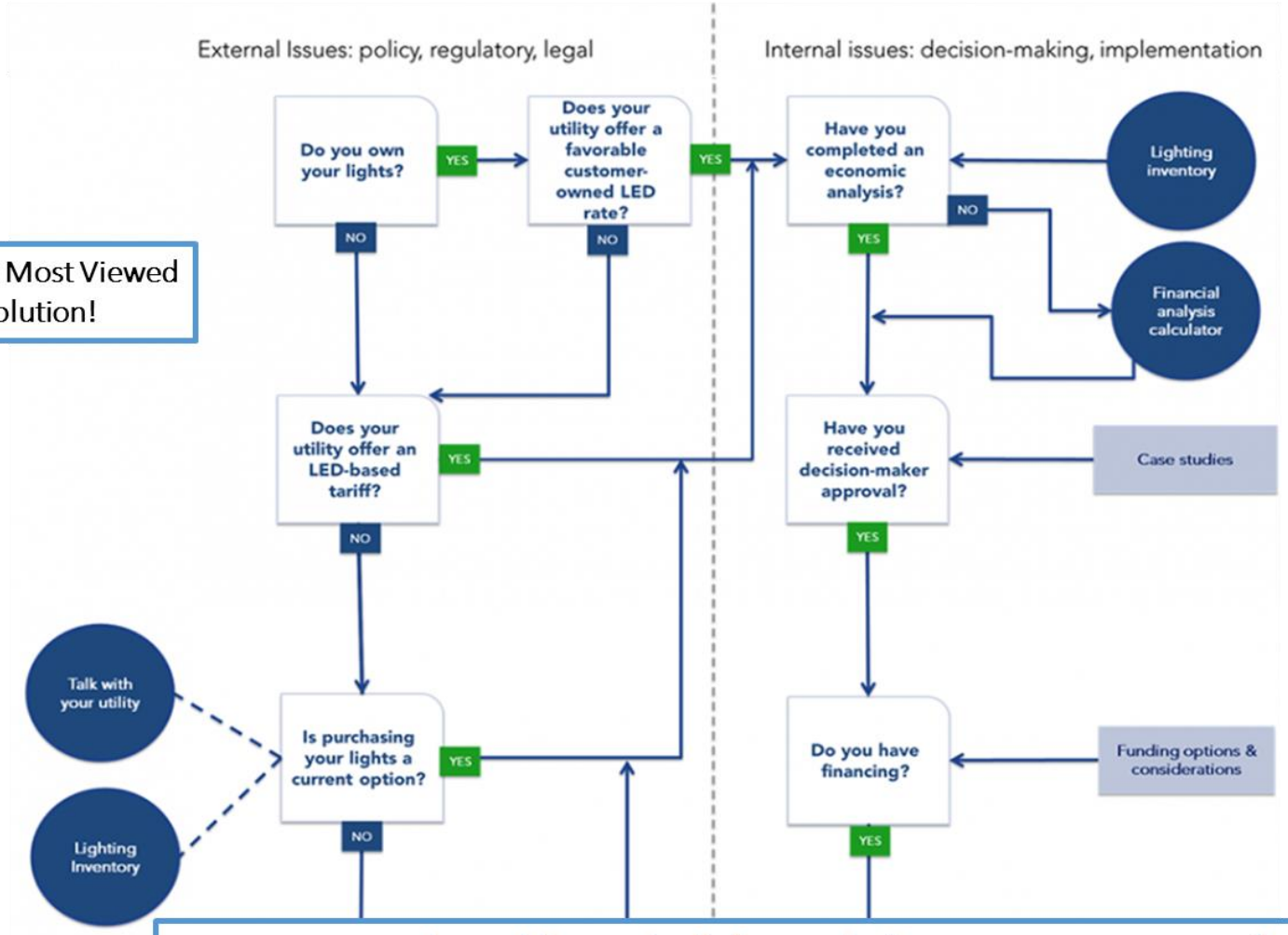
- ✓ *Achieved a commitment to upgrade 1.3 million streetlights with an expected annual savings of $48M*
- ✓ *Outdoor Lighting Toolkit includes:*
  - Outdoor Lighting Decision Tree Tool
  - Outdoor lighting Challenges and Solutions Pathways Report

https://betterbuildingssolutioncenter.energy.gov

- ❖ Toolkit webinar recording available; email us: stateandlocal@ee.doe.gov

Popular Resource: **Outdoor Lighting Decision Tree** Tool

Top Ten Most Viewed Solution!



http://betterbuildingssolutioncenter.energy.gov/accelerators/outdoor-lighting

Energy Planning

Sapna Gheewala

Energy Planning

- The development of a long-term energy plan is a foundational step for **improving energy performance** in a jurisdiction.
- Strategic energy planning helps local governments **focus efforts and actions** toward a **shared energy vision** that maximizes energy savings, economic growth, and public health benefits.
- Most state energy offices across the country are required to have current and long-term strategic energy management plans in place.
- These strategic plans help to ensure that state agencies are doing everything economically feasible to **manage energy consumption** and **reduce energy- and water-related costs.**
- State and local governments are uniquely positioned to identify and achieve their energy efficiency and renewable energy goals through programs that **leverage their roles as both governing bodies and facility or infrastructure owners**

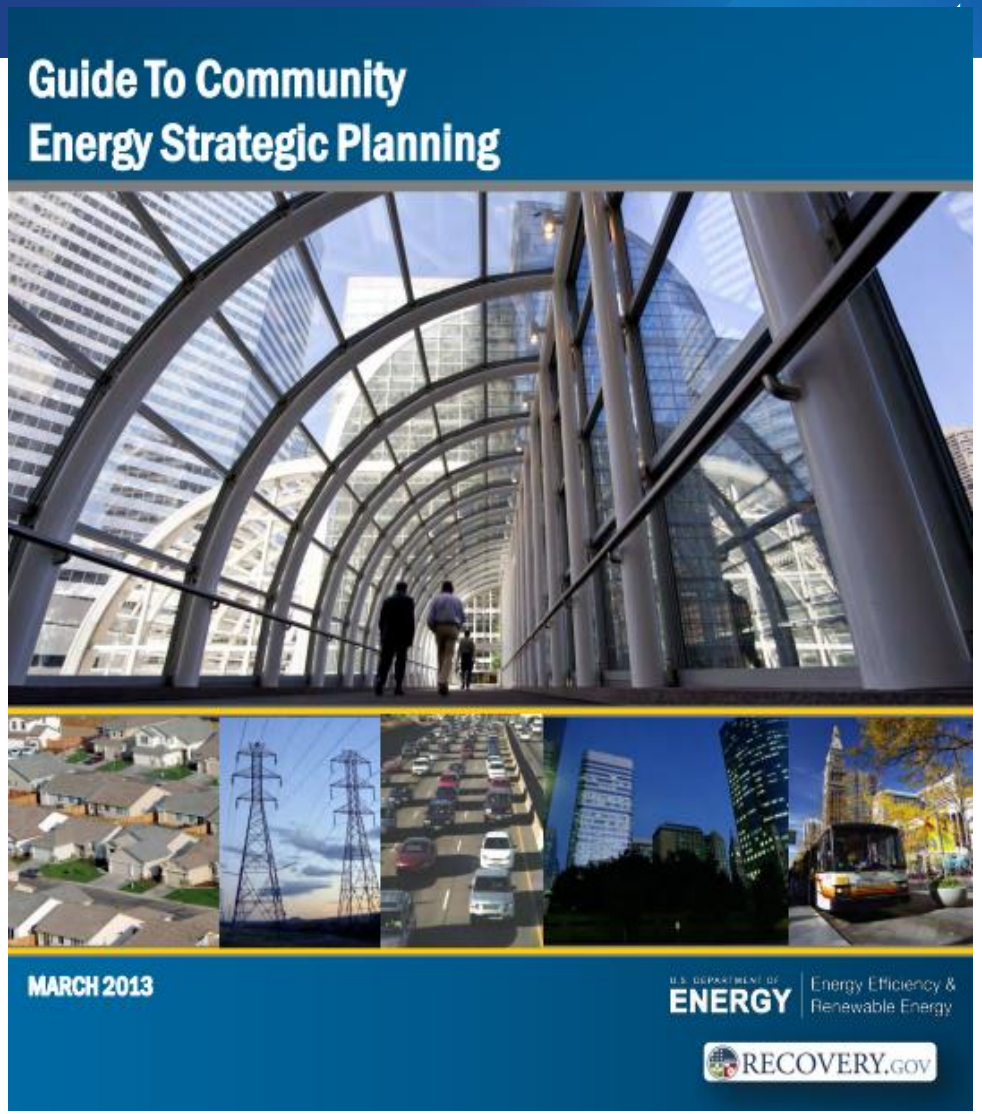
Energy Planning - *Barriers*

- Lack of institutional/political support
- No energy champion
- Limited staff resources
- To much information/ organizational strategy

Local Energy Planning

- The U.S. Department of Energy has developed the Guide to Community Energy Strategic Planning, which includes a **step-by-step process** for creating a robust strategic energy plan for local governments and communities that can help **save money, create local jobs, and improve national security**.

- The guide offers **tools and tips** to complete each step and **highlights examples** from successful planning efforts around the country.
  - Download the entire plan, or access information on each step.



Community energy Strategic Planning Process

[Guide to Community Energy Strategic Planning]

Case Study #1 – Knoxville, TN Implementation Model

COMMUNITY SIZE
Small Urban, Population 180,000

GOAL
To achieve a 20% reduction in energy intensity by 2020

BARRIER
Lack of unified organizational plan to implement efficiency improvements; lack of financing; and lack of access to consistent and transparent building performance data

SOLUTION
Convened a public-private task force to develop a work plan, entered into an energy services performance contract to retrofit municipal facilities, and implemented an energy data tracking system

OUTCOME
Decrease in energy consumption at 99 retrofitted facilities, ranging from 10% to 30% with an average decrease of 16%; energy use data is now more readily accessible to decision makers, highlighting the opportunities and benefits of improved energy performance and encouraging facility managers to proactively propose new efficiency ideas

Implementation Model:
Designing A Comprehensive Energy Plan

OVERVIEW
Like many cities, Knoxville, TN, recognized the importance of saving energy and reducing costs but lacked the comprehensive plan, funding, and performance data needed to achieve and track energy reductions. To respond to these challenges, the Mayor launched an **Energy and Sustainability Task Force** in 2007. The 15-member Task Force, made up of local private and community leaders as well as various City department heads, provided the City the critical early insight it needed to launch a sustainability program. That same year, the City joined ICLEI—Local Governments for Sustainability to access resources to advance sustainability at the local level. City staff used ICLEI's Clean Air and Climate Protection Software to inventory baseline energy use, costs, and greenhouse gas emissions.

More

Case Study #2 – Cleveland, OH

COMMUNITY SIZE
Small Urban, Population 390,000

GOAL
To achieve a 20% reduction in greenhouse gas emissions by 2020 based on 2010 levels

BARRIER
Lack of coordinated actions to accomplish the city's long-term municipal climate and energy goals

SOLUTION
Creation and implementation of the **Sustainable Cleveland Municipal Action Plan** (SC-MAP); focused specifically on municipal operations, the SC-MAP enabled the city to accelerate its sustainability efforts across city operations in a more coordinated manner to achieve higher impact outcomes

OUTCOME
Once fully implemented, the SC-MAP will result in annual savings from utility costs of more than $12 million and a 45% reduction in greenhouse gas emissions from municipal operations by 2030; as of August 2014, 13 of the 25 SC-MAP actions have been implemented in some form

Implementation Model:
Municipal Action Plan For Sustainability

OVERVIEW
Cleveland was already engaged in a number of sustainability initiatives when the Mayor's Office of Sustainability began the creation of the **Sustainable Cleveland Municipal Action Plan** (SC-MAP) using approximately $110,000 of its Energy Efficiency and Conservation Block Grant (EECBG) to initiate a central operating framework. The SC-MAP was intended to accelerate sustainability in city operations through a coordinated plan of action by engaging municipal employees and demonstrating lead-by-example strategies for the broader community. For each action, the SC-MAP includes a thorough explanation of the costs, benefits, performance indicators, lead agencies, resource savings, net cost savings, and next steps for implementation.

More

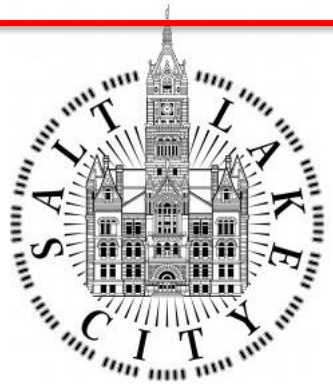
Case Study #3 – Cleveland, OH

ORGANIZATION TYPE
Local Government

BARRIER
A large portfolio of buildings overseen by numerous managers, making it difficult to unify energy management priorities and implementation strategies across City facilities

SOLUTION
A clearly-defined energy management policy, enforced by an Executive Order, which prioritized energy-efficiency best practices for all City-owned buildings

OUTCOME
The Executive Order improved the implementation and coordination of energy management practices across City facilities



Implementation Model: Executive Order for Energy Management of City Facilities

OVERVIEW

As part of the Better Buildings Challenge, Salt Lake City committed to improving the energy use intensity of its municipal buildings portfolio by 20 percent by 2025 (from a 2012 baseline). In order to achieve this ambitious goal and other energy objectives, the City sought to align underlying goals for all City facilities and to strengthen and unify facility managers' approaches to implementing energy-efficiency practices. To this end, in January 2015, Salt Lake City issued an Executive Order titled "Comprehensive Energy Management of Salt Lake City Facilities." The goal of the Executive Order is to implement a holistic energy management strategy across the entire City organization that maximizes energy efficiency best practices within City facility operations and minimizes carbon dioxide emissions and particulate pollution from City-owned buildings. A key strategy embedded within the Executive Order is the requirement that each department develop an energy management plan with standardized best practices, which is reviewed annually by the Sustainability Department Director and Sustainability Program Manager. This process drives the adoption of energy efficiency best practices and identifies where these practices have not yet been implemented.

Get Involved

- **Solar PV Training Program Application for City and County Staff**
  - Thursday, October 26, 2017, 2-3 pm Eastern

- This webinar will review trends in cities using renewable energy and provide guidance on applying to NREL's free training program for city and county staff to learn about putting solar on their facilities. The 2-page application will be available starting October 26th, with **applications due November 17th**.

- We know many local governments have made commitments to renewable energy but don't know how they will meet their targets. Selected city and county staff will be enrolled in a free training program, launching this winter.
  - Learning will take place remotely, and after completing the training, applicants will be connected with NREL staff to answer any remaining questions they have.
  - The aim is to assist 50 city and county staff, and by the end of September 2018, have those staff issue RFPs for more than 10 MW of solar on their facilities.

- Register here: https://register.gotowebinar.com/register/2723327959973778433

Additional Resources

- NASEO's Statewide Comprehensive Energy Plans website
  - An Overview of Statewide Comprehensive Energy Plans (NASEO)
  - State Energy Planning Guidelines (NASEO)
- Maps of energy Efficiency Savings Opportunities
- Leveraging Renewable Energy Tax Credits
- State and Local Policy Database
- SEE Action

Data

Agatha Wein

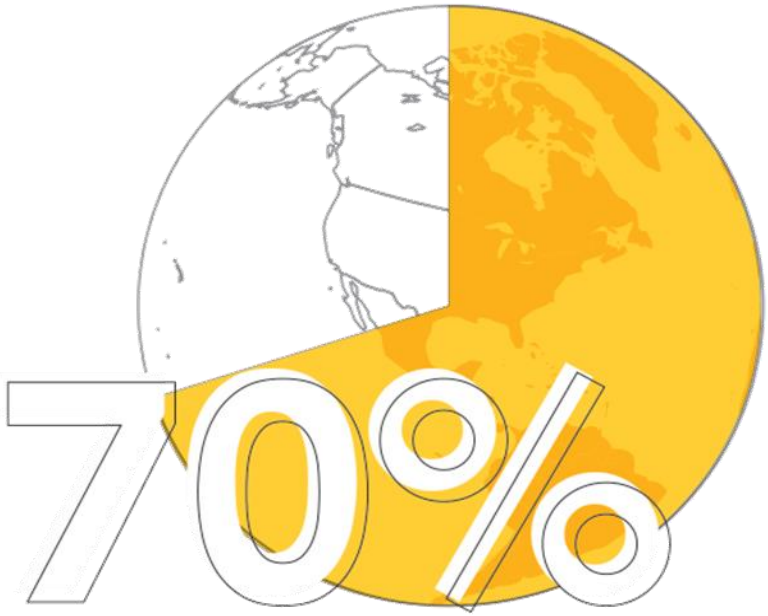
Cities-LEAP

Cities Leading through Energy Analysis and Planning

DELIVERS standardized, localized energy data and analysis *that* **ENABLES** Cities to lead clean energy innovation *and* **INTEGRATE** strategic energy analysis into decision making

WHY CITIES?

Cities **consume** approximately



of **global energy**

Cities-LEAP

SUPPORTS THE WIDESPREAD IMPLEMENTATION

of city-sponsored, data-driven energy policies, programs, and projects that have the potential

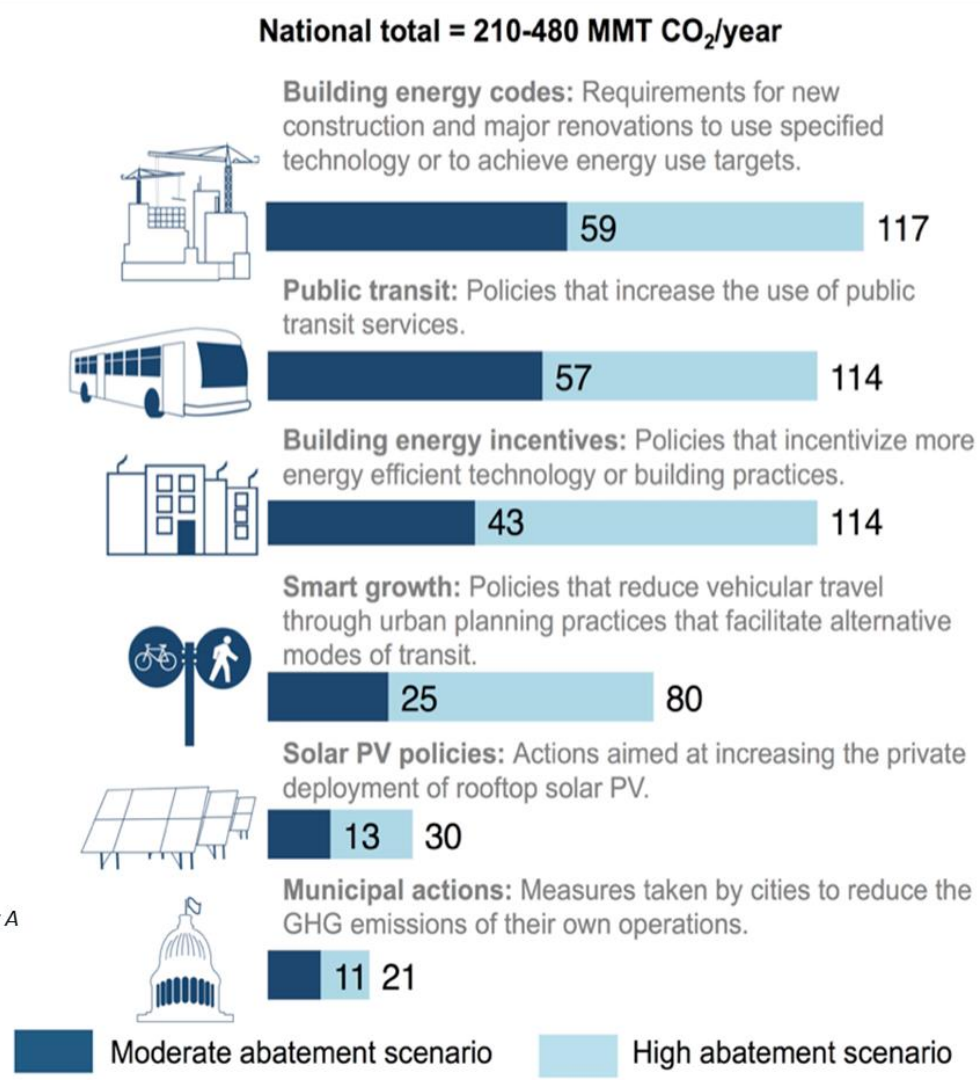
to

DRIVE A SEA CHANGE

in the national energy landscape.

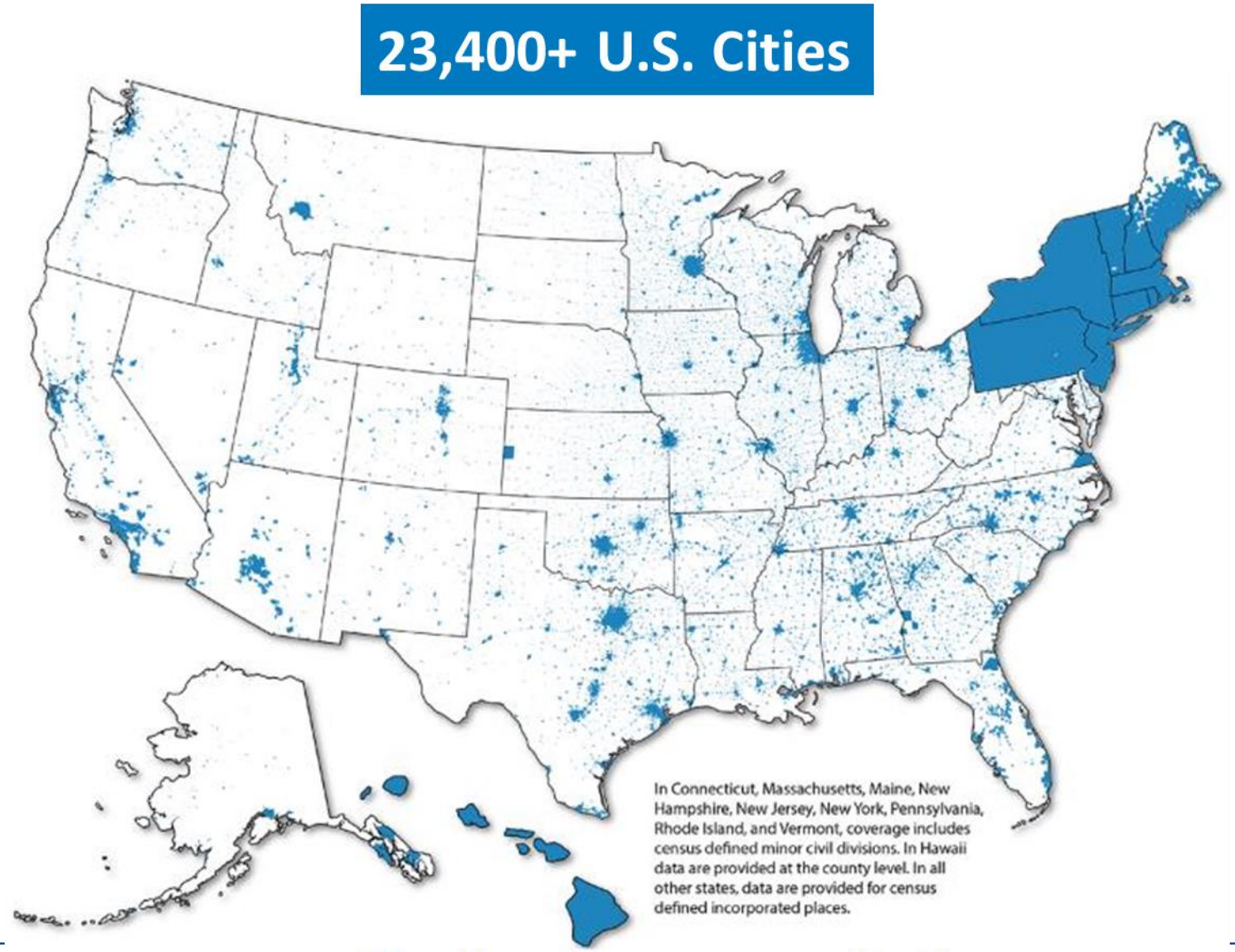
Carbon Pollution Reduction Potential of City Actions

Commonly implemented city actions have the potential to achieve 35% of the remaining US COP21 target.



O'Shaughnessy, E., et al. (2016). *Estimating the National Carbon Abatement Potential of City Policies: A Data-Driven Approach*. NREL: http://www.nrel.gov/docs/fy17osti/67101.pdf.

Cities-LEAP City Energy Profile Coverage



https://apps1.eere.energy.gov/sled/

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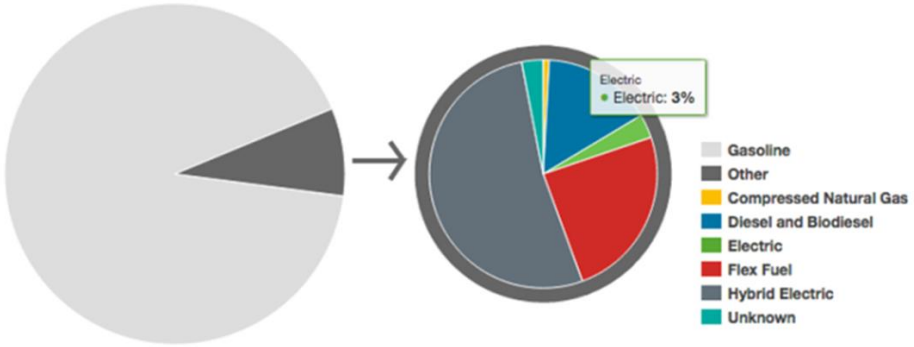
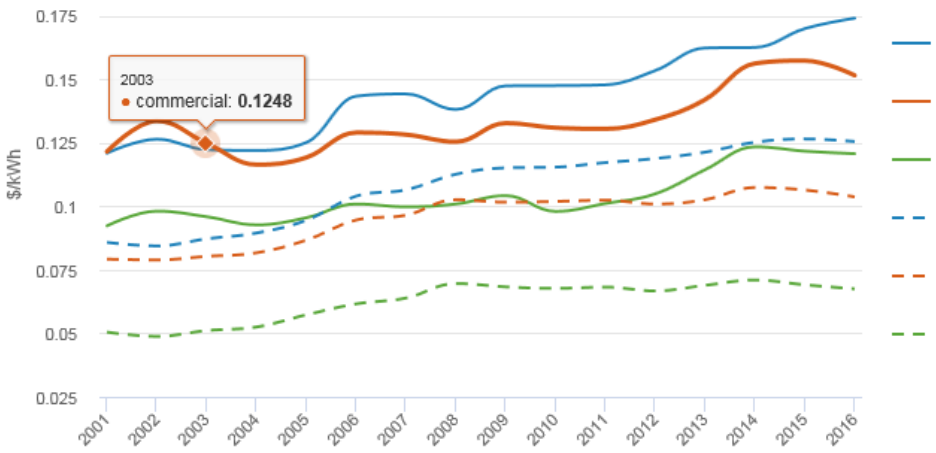
State & Local Energy Data (SLED) Tool

https://apps1.eere.energy.gov/sled/





City Energy Profiles Include:

- Electricity & Natural Gas Statistics
- Fuel Use, VMT by road type
- Generation Fuel Types
- PV Potential
- Building Stock Characterization
- Commercial Building Energy Benchmarking
- Commercial & Industrial Energy Use
- Greenhouse Gas Emissions Summary
- Local Energy Action Toolbox

Columbia, Missouri: Using Energy Data to Reduce Emissions and Achieve Low-Income Household Energy Savings

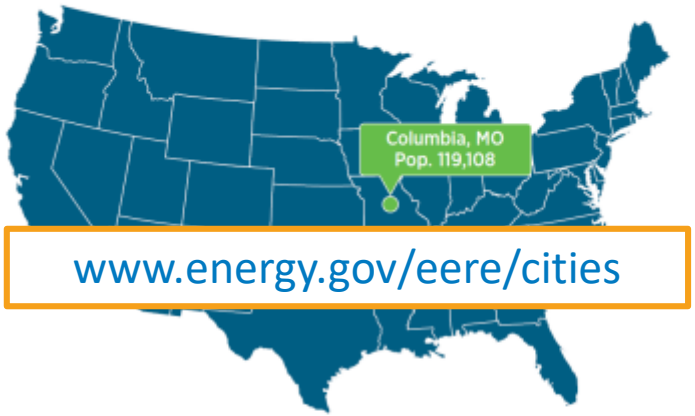
The U.S. Department of Energy's (DOE's) Cities Leading through Energy Analysis and Planning (Cities-LEAP) and the State and Local Energy Data (SLED) programs partnered with 10 U.S. cities to demonstrate ways SLED data and analysis could inform more strategic energy decisions. Cities across the country can use SLED data and follow this pattern as part of their own energy planning.

City Energy Questions

The City of Columbia, Missouri, wanted to inform its energy goal setting with a better understanding of the following:

1. What kinds of energy actions and policies would have the greatest impact in reducing the city's greenhouse gas (GHG) emissions?
2. Which energy actions and policies would have the greatest benefit for low- and moderate-income households, particularly renter-occupied households?

Smaller to mid-sized communities like Columbia often don't have the resources they need to determine the answers to these questions on their own.



www.energy.gov/eere/cities

"The Cities-LEAP and SLED data helped Columbia focus efforts to achieve our strategic plan's goal of reducing our carbon footprint. The data collected and analyzed helps staff focus on the actions that will have the greatest impact on this goal while benefiting low-income residents. It also gave us some great examples of best practices other cities are using to address the same community concerns."

— Barbara Buffaloe, Sustainability Manager, City of Columbia

Columbia is a college town with a large transient population and a relatively high percentage of renters. The city also has a higher-than-average percentage of the population living below the poverty level, as well as higher-than-average residential energy expenditures. As such, the city is prioritizing residential energy efficiency programs, particularly in the rental sector.

Data and Analysis

In conducting the analysis for Columbia, the National Renewable Energy Laboratory (NREL) evaluated data available on the SLED website (eere.energy.gov/sled), including demographic data on income and housing occupancy, per capita residential electricity usage and expenditures, residential building stock, building area by type of building, and current GHG emissions levels. Columbia provided measured data where available to replace the estimated data from SLED in the analysis. NREL then compared these Columbia-specific data points to both national averages and cities with similar populations and climate zones (cohort cities) to place the Columbia data into context.

The SLED data, along with the SLED toolbox of resources for city-level energy actions (apps1.eere.energy.gov/sled/cleap.html) informed the analysis, which provided a menu of options for Columbia

Reducing GHG Emissions

To answer Columbia's first question, NREL adjusted the GHG emissions summary for Columbia provided on SLED t

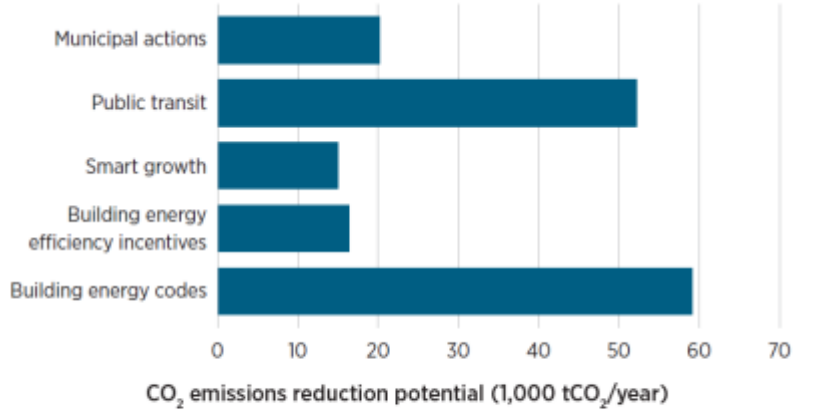
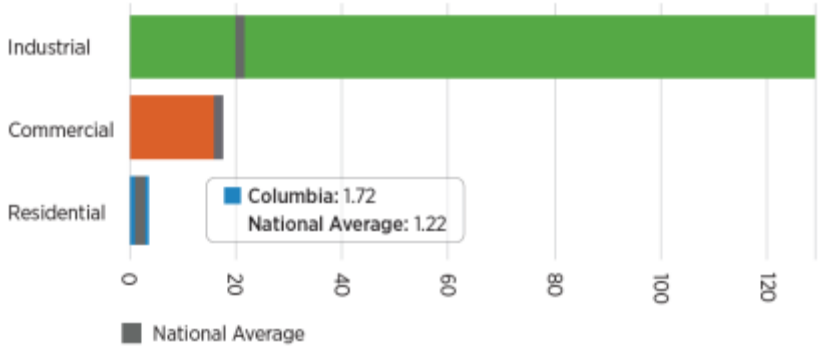


Figure 2. Annual GHG reduction potential of city actions for Columbia, Missouri, based on a carbon abatement potential study (energy.gov/eere/study-shows-carbon-emission-reductions-city-energy-actions), city-provided data, and SLED data (eere.energy.gov/sled)



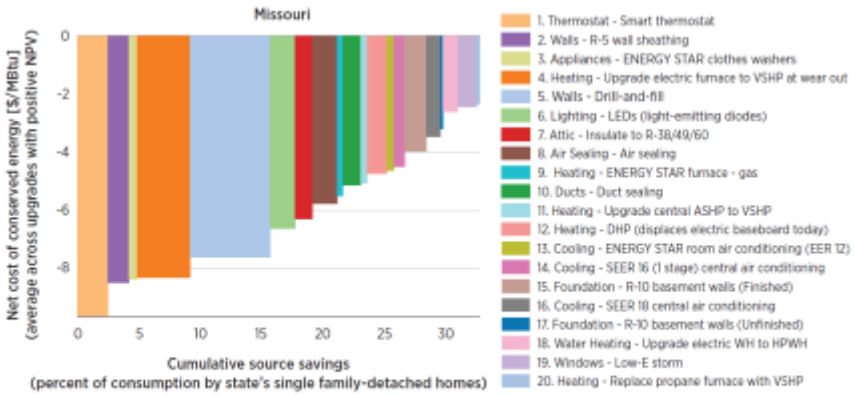


Figure 5. Energy efficiency supply curve for Missouri. Data from the NREL analysis of possible electricity cost savings (http://www.nrel.gov/docs/fy17osti/65667.pdf).

NPV = net present value; VHSP = variable-speed heat pump; ASHP = air-source heat pump; WH = water heater; HPWH = heat pump water heater.

Financing

Agatha Wein

Financing Energy Efficiency and Renewable Energy

- **Financing 101**
  1. **Access to capital is the primary barrier to completing most energy improvement projects.**
  2. ***Financing* means repayment of upfront capital (e.g. loans, leases, bonds), as opposed to grants or internal funding.**
     - ***Financing* often means leveraging private capital and finding private sector partners to bring investments to scale.**
  3. **Financing is necessary to execute energy efficiency and renewable energy projects, but it is not sufficient.**
     - **You need to know why you're pursuing the project and how it fits into a larger, long-term plan.**
  4. **There are multiple financing tools, partners, and pathways to achieving your goals.**
     - **Start by asking some simple questions…**

Know What You Want – Financing EE & RE

- **Ask Yourself…**
  - **Do you want to finance a particular project or portfolio of projects/buildings?**
    - Are they publically owned buildings?
    - Are they occupied by a community organization or non-profit organization?
    - Are they commercial or industrial facilities integral to the community?
  - **Do you want to create or join a program to finance multiple projects and achieve other public policy goals?**
    - What sector do you want to serve and why?
    - Does your local government have capital to deploy or not?
    - What is your willingness to raise capital (e.g., revenue or general obligation bonds)?
    - Does your locality have the skills and the risk tolerance to manage the program in its entirety or is it necessary to form partnerships?

Case Study #1 – Background

- Project Background
  - We want to upgrade our public facilities to be more efficient and comfortable, and to possibly include renewable energy.
  - We can't pay for a project this size out of our capital improvement budget – it needs to be financed.
  - We have tried to use Energy Service Companies (ESCOs), but we aren't attracting much attention because the total project size is too small.

Case Study #1 – Know What You Want

- **Ask Yourself…**
  - **Do you want to finance a particular project or portfolio of projects/buildings?**
    - Are they publically owned buildings? Yes
    - Are they occupied by a community organization or non-profit organization?
    - Are they commercial or industrial facilities integral to the community?
  - **Do you want to create or join a program to finance multiple projects and achieve other public policy goals?**
    - What sector do you want to serve and why?
    - Does your local government have capital to deploy or not?
    - What is your willingness to raise capital (e.g., revenue or general obligation bonds)?
    - Does your locality have the skills and the risk tolerance to manage the program in its entirety or is it necessary to form partnerships?

Case Study #1 – Hamilton County, OH

- Energy Savings Performance Contracting w/ Aggregation
  - Leaders sought to serve local governments within the county by completing energy efficiency upgrades at public facilities.
  - Aggregated together facilities and projects from three separate local governments and arranged an Energy Savings Performance Contract with a private Energy Service Company.
  - Achieved $3 M in energy savings over 15 years, 19 public facilities, and three local governments.

Lessons

- Inter-local partnerships and aggregating many small upgrades made the project possible.
- The County played an important role in convening local governments, forming a public-private partnership.

Case study courtesy of Steve Morgan, Clean Energy Solutions; Photo courtesy Ameresco

Financing Public Facilities
Applicable Resources from DOE

- Energy Savings Performance Contracting (ESPC) Toolkit
  - "Pay for the energy upgrade today with tomorrow's savings"
- *Want to focus on schools?*
  - *ESPC Sector Guide: K-12 Schools*
- *Want to focus on streetlights?*
  - Outdoor Lighting Toolkit
- *Looking for other financing options?*
  - Engage with your State Energy Office about financing products offered to local governments (e.g., revolving loan funds).

Case Study #2 – Background

- Project Background
  - We want our local businesses to benefit from energy efficiency and renewable energy improvements.
  - We want to achieve redevelopment and economic growth through investment in commercial properties.
  - We don’t have capital or significant staff time to devote.

Case Study #2 – Know What You Want

- **Ask Yourself…**
  - **Do you want to finance a particular project or portfolio of projects/buildings?**
    - Are they publically owned buildings?
    - Are they occupied by a community organization or non-profit organization?
    - Are they commercial or industrial facilities integral to the community?
  - **Do you want to create or join a program to finance multiple projects and achieve other public policy goals?**
    - What sector do you want to serve and why? Commercial
    - Does your local government have capital to deploy or not?
    - What is your willingness to raise capital (e.g., revenue or general obligation bonds)?
    - Does your locality have the skills and the risk tolerance to manage the program in its entirety or is it necessary to form partnerships? No; partnership is needed

Case Study #2 – Travis County, TX

- Property Assessed Clean Energy (PACE)
  - Leaders sought to develop an economic development tool that would benefit the commercial sector and not create a burden for taxpayers.
  - First Texas County to adopt Commercial PACE financing in 2015; partnered with the Texas PACE Authority to administer program.
  - Three projects completed to-date and $2 M in private capital invested in diverse facilities such as an elderly care center.

Lessons

- Counties can enable energy financing across sectors w/ minimal input through partnerships.
- Commercial PACE financing is an economic development tool in addition to a tool for financing EE & RE.

Case study from Texas PACE Authority; See: http://www.texaspaceauthority.org/travis-county/

Learn About and Enable PACE Financing Applicable Resources from DOE

- State and Local Solution Center – Property Assessed Clean Energy

- *Interested in Commercial PACE?*
  - C-PACE Fact Sheet for State and Local Governments
  - Forthcoming Report – *Lessons in C-PACE Leadership: The Path from Legislation to Program Launch*

- *Interested in Residential PACE?*
  - *Updated Guidelines for Residential PACE Financing*

Case Study #3 – Background

- Project Background
  - We want to help the underserved in the low and moderate income residential sector.
  - We have capital to invest and/or we're willing to raise capital.
  - We don't have significant staff time or skills to devote.

Case Study #3 – Know What You Want

- **Ask Yourself…**
  - **Do you want to finance a particular project or portfolio of projects/buildings?**
    - Are they publically owned buildings?
    - Are they occupied by a community organization or non-profit organization?
    - Are they commercial or industrial facilities integral to the community?
  - **Do you want to create or join a program to finance multiple projects and achieve other public policy goals?**
    - What sector do you want to serve and why? Residential
    - Does your local government have capital to deploy or not?
    - What is your willingness to raise capital (e.g., revenue or general obligation bonds)? We are willing and interested
    - Does your locality have the skills and the risk tolerance to manage the program in its entirety or is it necessary to form partnerships? No; partnership is needed

Case Study #3 – Southern Arkansas

- On-Bill Financing for Low and Moderate Income Customers
  - Leaders from the Ouachita Rural Electric Cooperative sought to deliver low-cost financing for residential energy upgrades.
    - In 5 counties that comprise Ouachita service territory, median incomes in 2011 were between 10 and 21 percent below the state median.
  - The Cooperative partnered with EEtility to administer a program whereby projects are structured to be cash flow positive, and customers repay via electric bills. Investments are secured by a loan loss reserve from the state.
  - Most participants start saving money immediately with the average participant saving $27 per month *on net* (after repayment of upgrades).

Lessons

- Utilities are key partners in energy efficiency and renewable energy financing programs.
- States or local governments can provide credit enhancements to reduce risk, and attract private investment.

Case study from SEE Action LMI-EE Report, 2017 (Next page); Photo credit: Paul Caldwell

Learn About LMI Financing Applicable Resources from DOE

- SEE Action Reports
  - *Energy Efficiency for Low-and-Moderate-Income Households: Current State of the Market, Issues, and Opportunities (2017)*
  - *Credit Enhancement Overview Guide (2014)*

- Clean Energy for Low Income Communities Accelerator

- *Interested in raising capital to support these efforts?*
  - Qualified Energy Conservation Bonds: Frequently Asked Questions from State and Local Governments

Additional DOE Resources

- *Want to better understand what financing resources are available in the market?*
  - Current Practices in Efficiency Financing: An Overview for State and Local Governments
  - Better Buildings Financing Navigator

- *How do I stay engaged?*
  - State and Local Solution Center: Pay for Energy Initiatives
  - Email us at: stateandlocal@ee.doe.gov
  - Subscribe to our monthly newsletter: The State and Local Spotlight

Questions?

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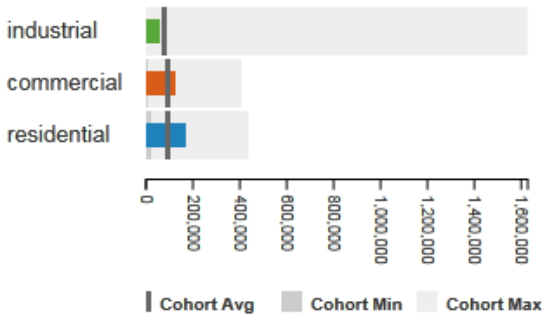
Appendix Slides

City Energy Profiles: Electricity, Natural Gas

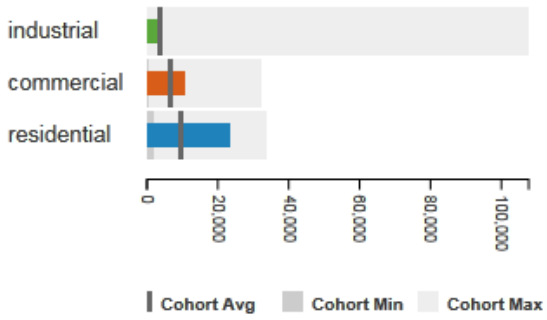
Learning about the energy market in your city and similar cities can lead to more strategic energy decisions toward a clean energy future.

Electricity Statistics for Salem, Massachusetts in 2013 derived

ELECTRICITY USAGE
(MWH)

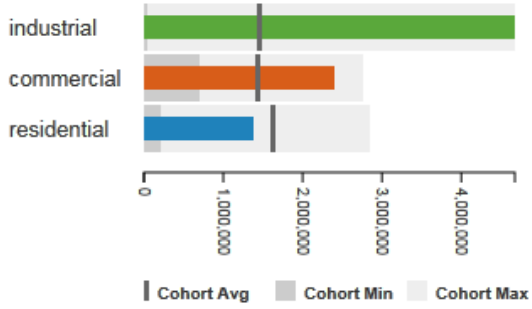


ELECTRICITY EXPENDITURES
($1000)

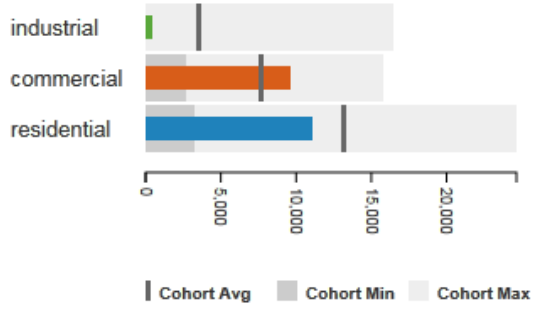


Natural Gas Statistics for Cheyenne, Wyoming in 2013 derived

NATURAL GAS USAGE
(MCF)



NATURAL GAS EXPENDITURES
($1000)

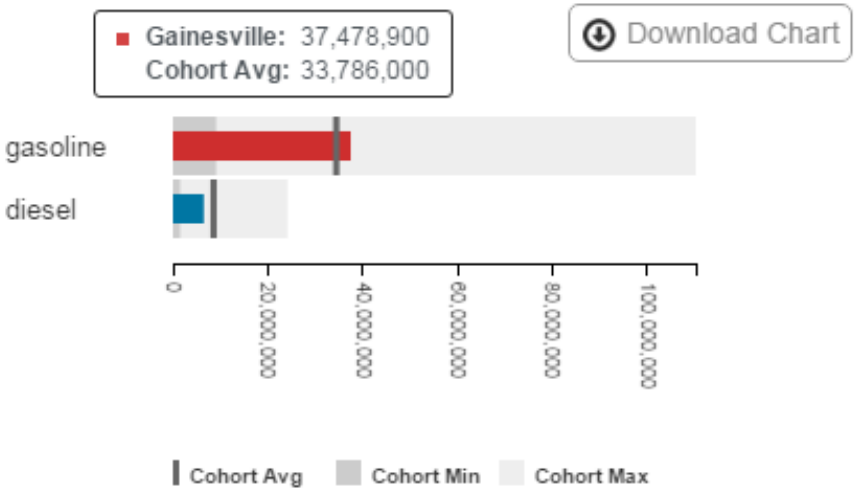


City Energy Profiles: Fuel Use, VMT

Vehicle Data for Gainesville, Florida in 2013 derived

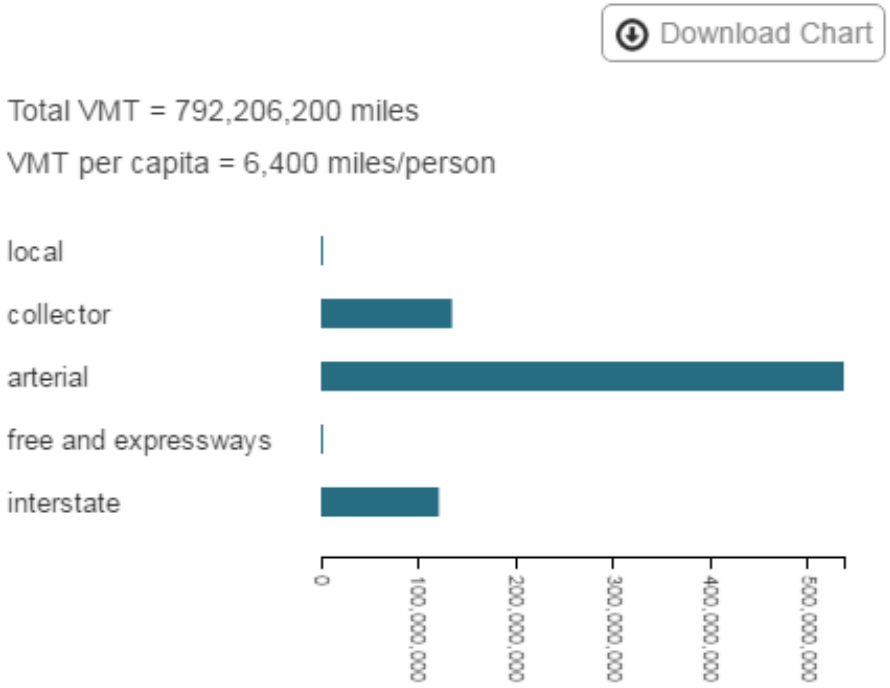
ON-ROAD VEHICLE FUEL USE (LIGHT, MEDIUM, AND HEAVY DUTY)

(GALLONS)



VEHICLE MILES TRAVELED BY ROAD CLASS

(TOTAL VMT)

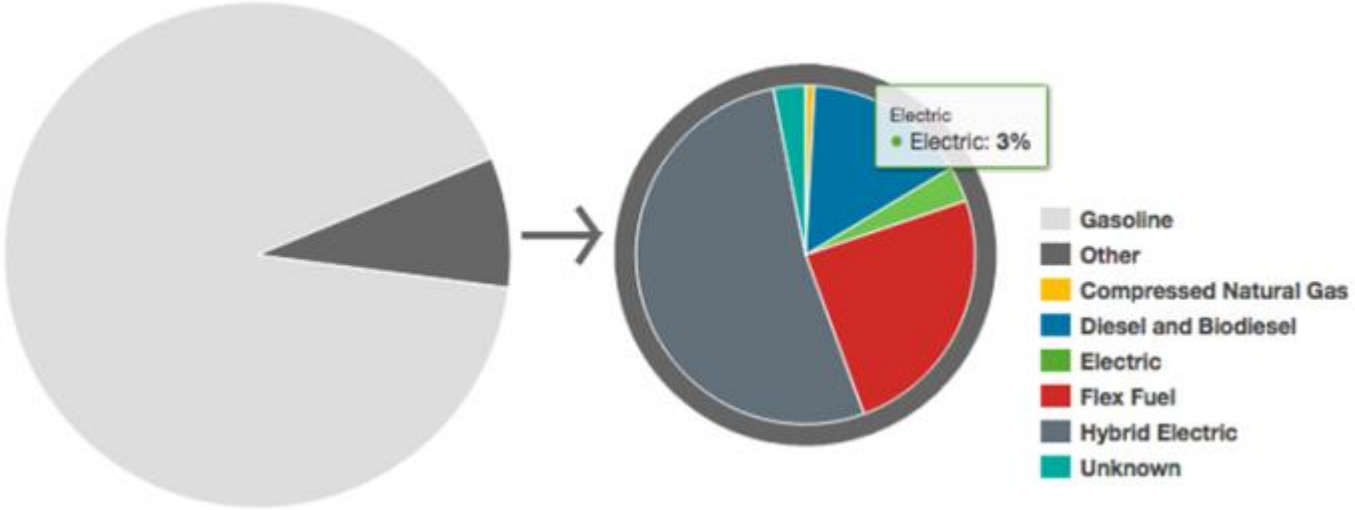


City Energy Profiles: Fuel Types, PV Potential

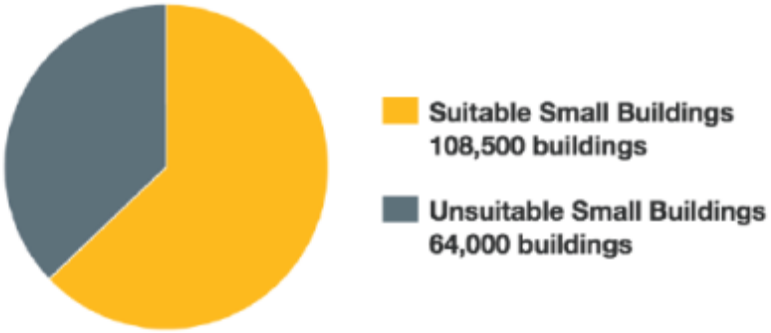
Light-Duty Alternative Fuel and Conventional Vehicle, Oakland, CA

Total number of light-duty vehicles: 252,500

Average fuel economy of light-duty vehicles: 25.5 MPG

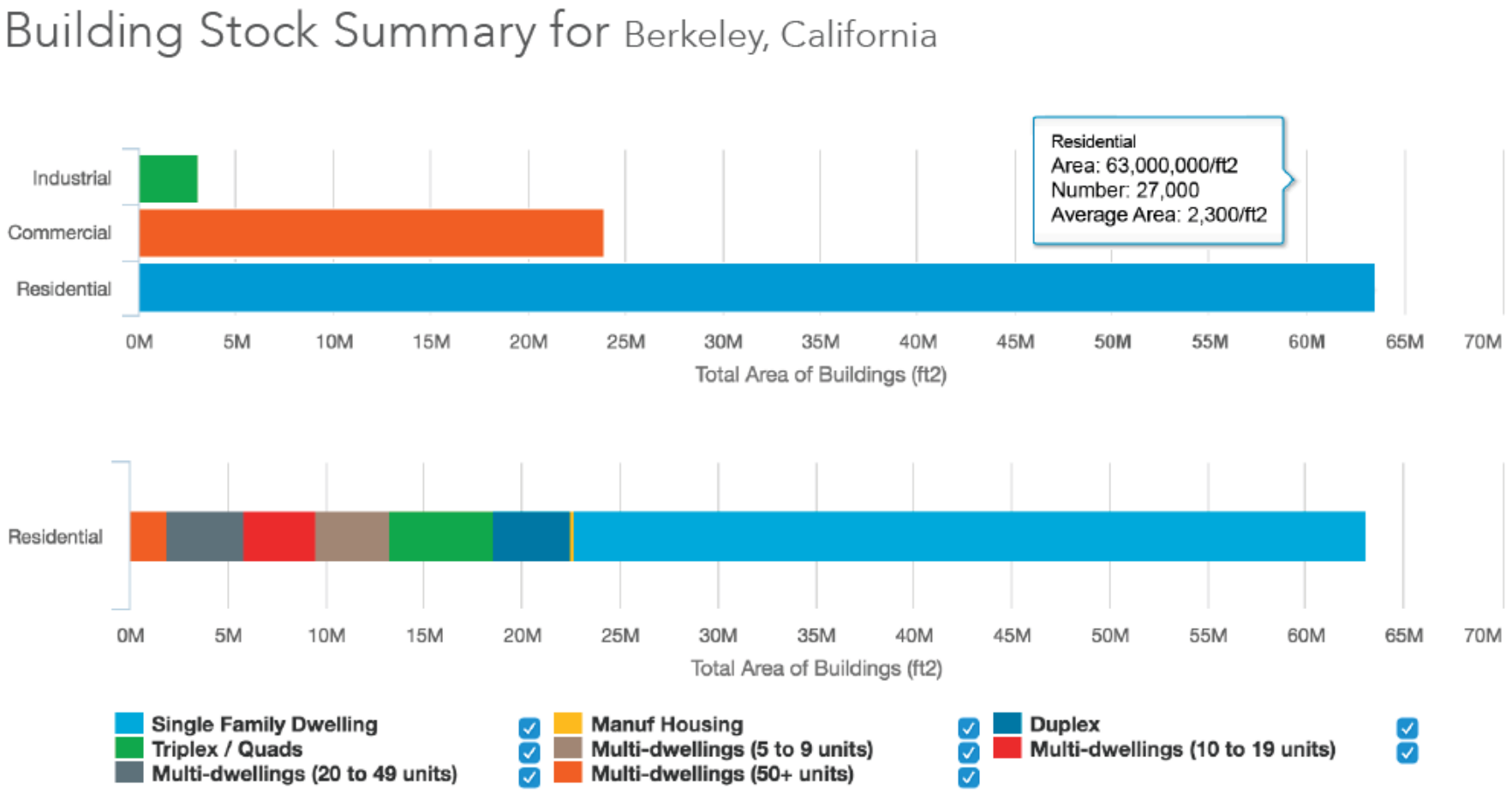


Small Building Rooftop PV Potential, Denver CO



Suitable area	5,000,000 m2
Capacity potential	700,000 kW
Energy generation potential	1,000,000 MWh

City Energy Profiles: Building Stock Characterization



http://apps1.eere.energy.gov/sled/#/.

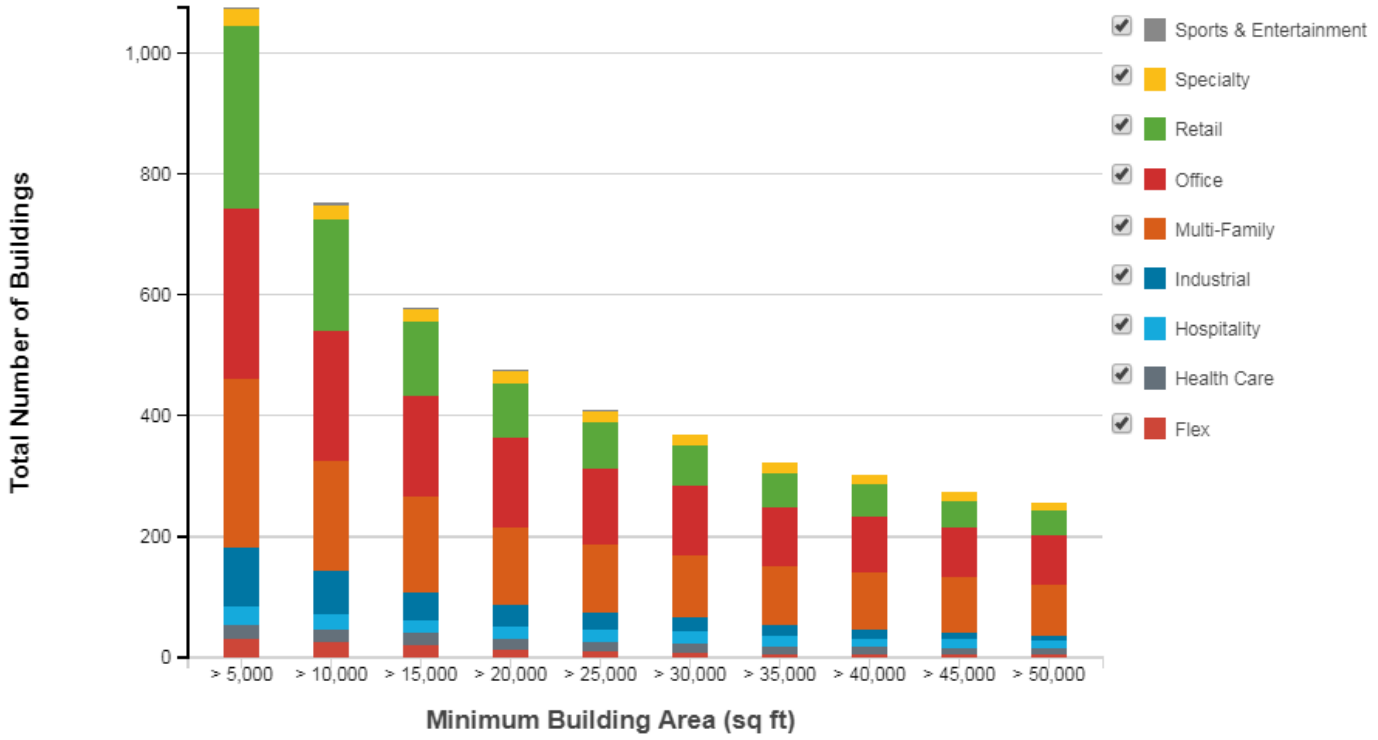
City Energy Profiles: Commercial Building Energy Benchmarking

Commercial Building Energy Benchmarking for Lakewood, Colorado

derived

The following chart shows commercial properties from CoStar Realty Information, Inc. (www.costar.com) by building area and property type. Cities can use this data to estimate the potential scope and impact of building energy benchmarking policies or programs.

Download Chart



Building Area

Number of Buildings

City Energy Profiles: Commercial & Industrial Activity

Commercial Activities for Port St. Lucie, Florida derived

Commercial Activities - Top 5 Electricity Users	Number of Establishments	Electricity Use (MWh)	Rank	Electricity Use per Establishment	Rank
Hospitals	2	14,263	1	7,131	1
Nonstore Retailers	30	13,153	2	438	4
General Merchandise Stores	13	11,611	3	893	2
Administrative and Support Services	256	6,650	4	25	22
Food and Beverage Stores	41	4,968	5	121	10

Commercial Activities - Top 5 Natural Gas Users	Number of Establishments	Natural Gas Use (Mcf)	Rank	Natural Gas Use per Establishment	Rank
Hospitals	2	57,073	1	28,536	1
Nonstore Retailers	30	17,019	2	567	3
Nursing and Residential Care Facilities	30	13,702	3	456	4
Ambulatory Health Care Services	279	8,549	4	30	25
Educational Services	28	6,651	5	237	7

◉ **total usage**

○ **per establishment**

City Energy Profiles: Greenhouse Gas Emissions Summary

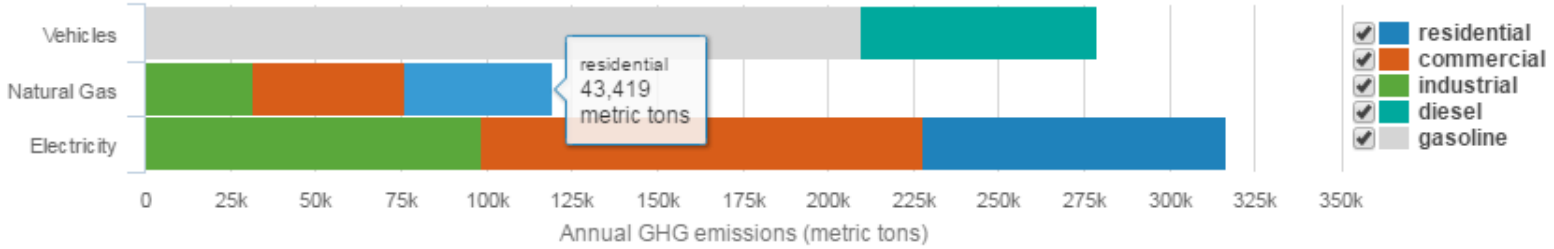
Annual Energy GHG Emissions for Redmond, Washington derived

Total GHG: 715,000 metric tons

GHG per capita: 13 metric tons/person

GHG per BTU: 0.08 metric tons/MMBTU

Download Chart



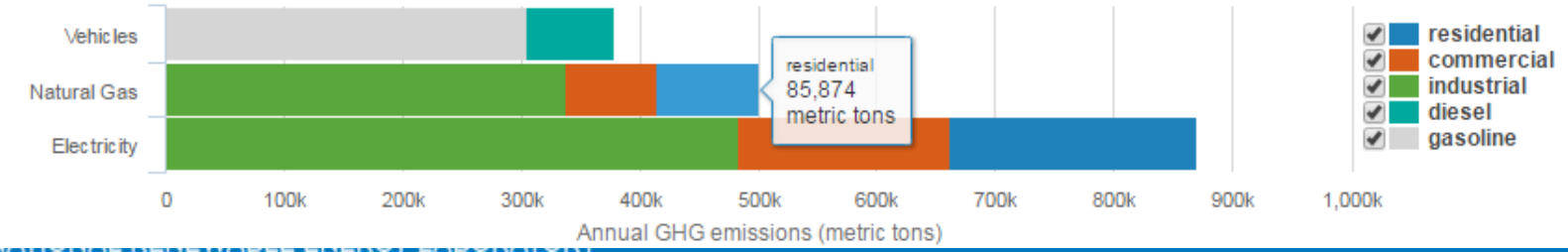
Annual Energy GHG Emissions for Canton, Ohio derived

Total GHG: 1,750,200 metric tons

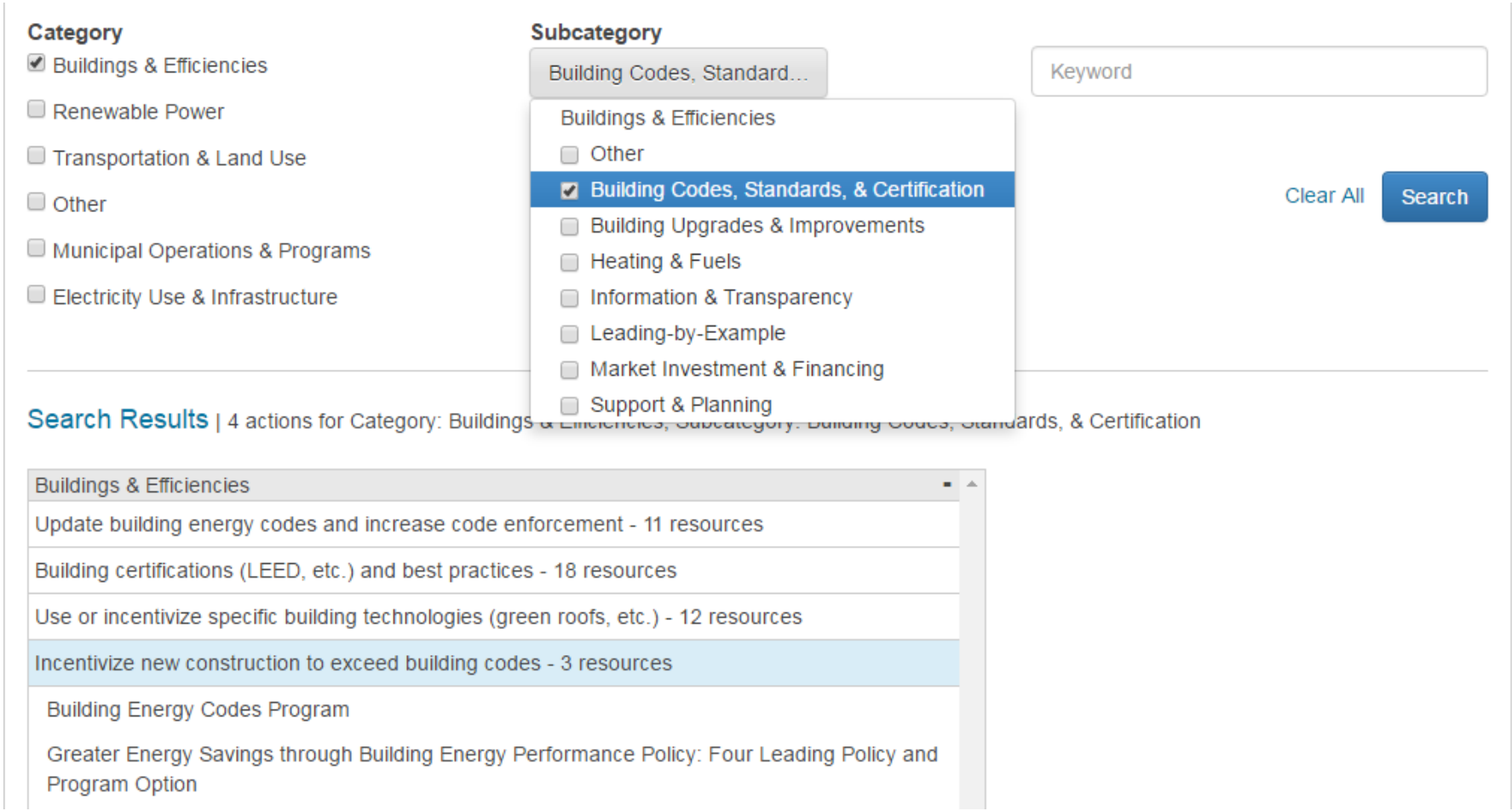
GHG per capita: 23 metric tons/person

GHG per BTU: 0.10 metric tons/MMBTU

Download Chart



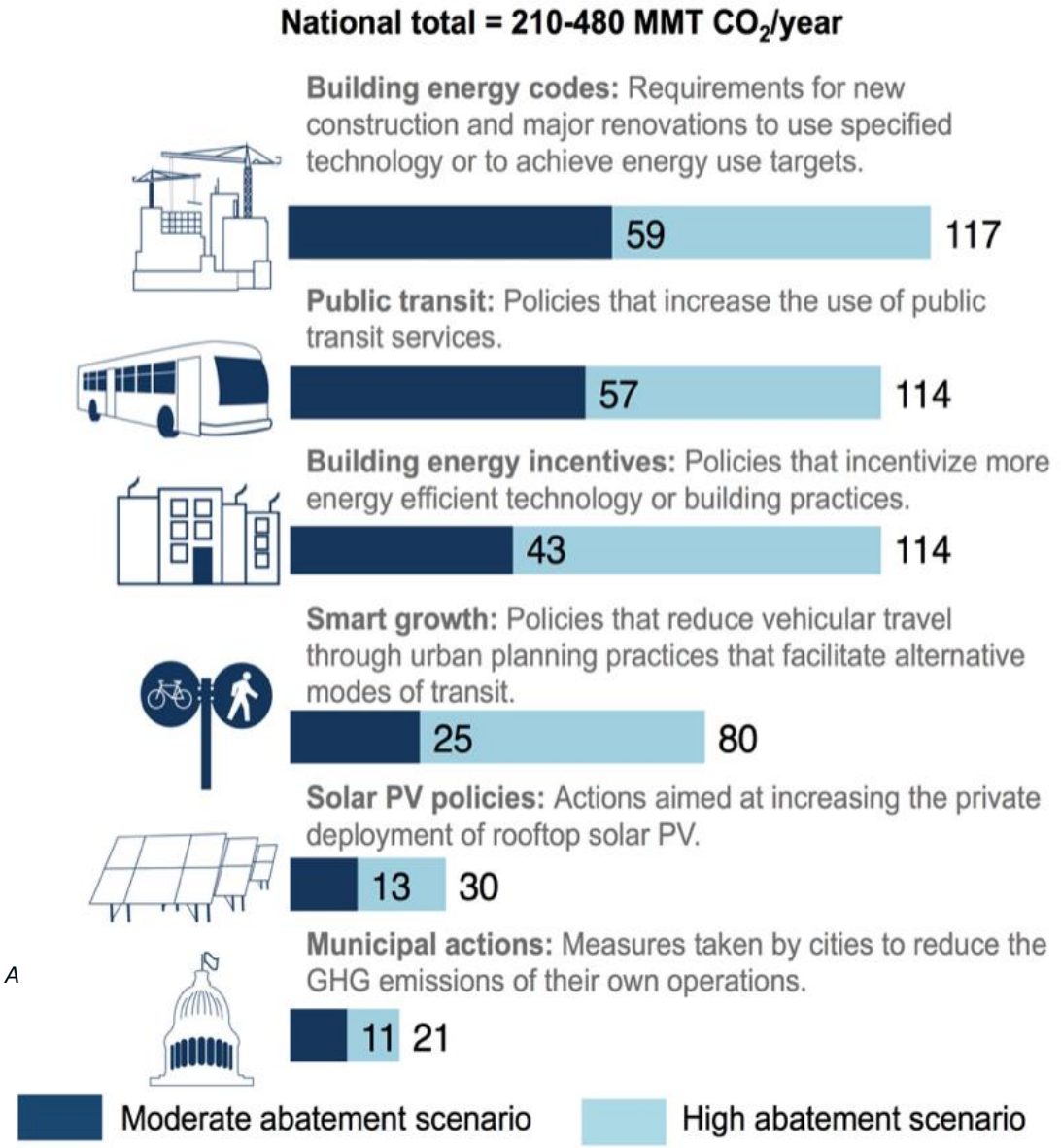
Cities-LEAP Local Energy Action Toolbox



https://apps1.eere.energy.gov/sled/cleap.html

Carbon Pollution Reduction Potential of City Actions

Commonly implemented city actions have the potential to achieve 35% of the remaining US COP21 target.



O'Shaughnessy, E., et al. (2016). *Estimating the National Carbon Abatement Potential of City Policies: A Data-Driven Approach*. NREL: http://www.nrel.gov/docs/fy17osti/67101.pdf.