



Greenlink USDN urban sustainability directors network

BROADLY BENEFICIAL CLEAN ENERGY PLANNING Developing Processes, Indicators, Scenarios and Policies for Equitable And Inclusive Decarbonization

Session 2: Defining and modeling scenarios



Engagement

partner





Introductions – training team













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Overall outline of training series

Session 1: Stage-setting and baseline data

- Concepts and methods for equity-focused planning
- Overview of scenariobased planning
- Choosing indicators
- Obtaining data to measure indicators

Session 2: Defining and modeling scenarios

- Interpreting and communicating baseline data
- Defining and modeling scenarios
- Evaluating scenarios

Session 3: Turning scenarios into policies

- Understanding scenario outcomes
- Identifying and prioritizing and policies and programs
 - Preparing for implementation

Scenario Planning "test exercise" (Level 1 cities)

Select indicators

- Review baseline
- Select scenarios

 Review scenario outcomes



Our theory of change

Information is power

scenario planning

- Partially frees process from biases & blindspots
- Promotes foresight, not forecasting
- Encourages cross-sector communication
- Structures iterative solution development

Values and voice provide direction

equity focus

- Diversity of voices produces larger solution-space
- Identifying and measuring what matters
- Broader inclusion and more equitable distribution of benefits
- More durable public and political support



Recap of Session 1

Equity and inclusive stakeholder engagement

Scenario planning



Selecting indicators and baseline data







Components of Equitable Clean Energy Scenario Planning

| Planning component | Questions | | | |
|-----------------------|--|--|--|--|
| Goals | What are your government's and/or community's goals? | | | |
| Process | How do you assure stakeholders are listened to? | | | |
| Indicators | What are stakeholders' values and concerns? | | | |
| Baseline | Where are you now? | | | |
| Scenarios | What are your possible pathways?What actions do you want to consider?How do you design them equitably? | | | |
| Impacts | What are the likely outcomes? | | | |
| Policies and programs | How do you design and implement the actions? | | | |
| Distributional design | Who benefits? Who pays? | | | |



Objectives for today

By the end of today's session, you should...

- Feel comfortable interpreting and communicating your baseline indicator data
- Understand the process of defining energy-policy scenarios through an inclusive stakeholder-driven process
- Be familiar with scenario modeling methods
- Be ready to develop scenarios for your community



Agenda

Core session – 1.5 hours

- 1. Communicating baseline data
- 2. Interpreting your baseline discussion
- 3. Developing scenarios
- 4. Modeling scenarios
- Case study: using scenarios for stakeholder engagement District of Columbia
- 6. Using the Scenario Calculator
- 7. Wrap-up & homework

Optional Q & A and discussion – 30 minutes



Communicating baseline data

Example indicators that might be used in a baseline

Demographics

Population Racial composition Educational attainment Median age

Housing characteristics

Average household size Households with children Number of bedrooms Eviction rates House heating fuel (gas, electricity, renewables, etc.) Mortgage status Median property value Percent of renters in a geography Housing type, rented or owned (single family detached, multifamily, townhouse, etc.)

Transportation characteristics Means of transportation Travel time to work Average commute to work (in minutes)

Income characteristics Gini index of income inequality Poverty status Number of individuals utilizing the Supplemental Nutrition Assistance Program Households with living costs exceeding 30% of their income Health characteristics (for select cities) Prevalence of arthritis Prevalence of asthma Prevalence of binge drinking Prevalence of cancer (except skin cancer) Prevalence of cholesterol screening Prevalence of chronic obstructive pulmonary disease Prevalence of colonoscopy and/or sigmoidoscopy Prevalence of coronary heart disease Prevalence of current lack of health insurance Prevalence of diabetes Prevalence of high blood pressure Prevalence of high cholesterol Prevalence of kidney disease Prevalence of no leisure time physical activity Prevalence of loss of teeth Prevalence of mammography use Prevalence of mental health of not good for equal to or greater than 14 days Prevalence of obesitv Prevalence of PAP smear use Prevalence of poor physical health Prevalence of sleeping less than 7 hours Prevalence of smoking Prevalence of stroke Prevalence of taking medication for high blood pressure Prevalence of visits to the dentist Prevalence of visits to doctors for routine checkups within the past year



The baseline's role includes information and communication

Illuminate assets, opportunities, and current status of stakeholder-relevant indicators





Validate and/or challenge stakeholders' perceptions of community inequity

Establish common reference points for discussion





Facilitate agreement on shared goals





Tips for turning data into discussion

Goal is to move from specific (e.g., indicators) to general (e.g., scenarios)

Make things vivid

- Use many types of data visualization
- Use narratives
- Invite stakeholders to share their personal perspectives

Start with unstructured discussion of the baseline indicators

- Start with one indicator at a time
- Do they make sense?
- Which indicators look good/bad?
- What would be the ideal situation?
- Which indicators are more/less important?



Baseline report: key content and audiences



- Executive summary
- Stakeholder engagement process
- Energy vision
- Energy profile
 - Key facts
 - Current energy use and cost
 - Projected future energy use and cost
 - Related efforts underway in the community
- Gaps and challenges
- Next process steps





Communicating numerical info is all about converting numbers into familiar things



Sources: City of Knoxville, 2007. Knoxville's Energy Inventory: Government and Community Analysis and Strategic Plans. Greenlink and City of Atlanta.



Interpreting your baseline

Which indicators are most important to your community? (Check the two you most wanted to see mapped)

Demographics

Population Racial composition Educational attainment Median age

Housing characteristics

Average household size Households with children Number of bedrooms Eviction rates House heating fuel (gas, electricity, renewables, etc.) Mortgage status Median property value Percent of renters in a geography Housing type, rented or owned (single family detached, multifamily, townhouse, etc.)

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Discussion: Indicator selection

Why did you choose the indicators you did?

Are there any that you would have chosen, but they weren't on the list?

Baseline energy equity indicator maps -Example: Las Cruces' energy burden, heating fuel, housing structure

Las Cruces's Energy Burden face on an annual basis, as well as the number of households living above a selected burden.
Energy burden represents the percentage of annual income that a household or individual pays towards their energy bills (electricity and/or natural gas). A household is troicailly considered in "*Wirth Wardh*" if their energy burden exceed

Welcome to Las Cruces' interactive utility burden dashboard! Here you will find information about each neighborhood's utility burden that Las Cruces' residents

Latery out our sports and percents the percentage of minimum income that a non-motion individual pays towards their energy bills (electricity and/or natural gas). A household is typically considered in "*high burden*" if their energy burden exceed 6% of their annual income and in "*energy powers*" if their bills exceed 10%. Energy burdens can be influenced by many factors such as poor insulation, outdated appliances, and/or high utility use.

The map on the left hand side explains the median utility burden for each census tract within Las Cruces, NM. You can understand which neighborhoods experience higher median utility burdens and which experience lower utility burdens. Use your mouse to scroll over each census tract in order to understand the median household income and energy burden in that tract.

The map on the right hand side shows the number of households living above a chosen energy burden threshold. For example, a neighborhood that experiences a relatively low median utility burden as seen on the *right-hand map* may have more households in burden relative to their overall population.

Energy (Electricity + Gas) Burden

De the slider in see how many households are thing above the energy burder thei you cheese. The average energy burder for Las Cruces is 5:41%, while the nation average is 3:23%.



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Discussion: Baseline results

What did you learn from your baseline indicators and maps?

What might you do differently as a result of this information?

How might you use this information to engage and communicate with stakeholders?

Developing scenarios

Scenarios as possible futures





Scenarios are a combination of actions





What level of detail? Identifying available actions





Scenario development: action-spaces



- Good if you have 1-2 actions
- Good if you have many actions, but they cluster in their societal effects
- Easy to think about
- Easy to communicate





Scenario 3 (Activity Centers/Corridors)



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INSTITUTE

Scenario development: action combinations

If you have more than two actions, use check-box matrices or slider panels.

The idea is to keep things visual.

| | Scenario A | Scenario B | Scenario C |
|----------|--------------|--------------|--------------|
| Action 1 | \checkmark | | |
| Action 2 | \checkmark | \checkmark | |
| Action 3 | | | \checkmark |
| Action 4 | \checkmark | \checkmark | \checkmark |
| Action 5 | | \checkmark | |





| | | Scen | arios | |
|--|--------------|--------------|--------------|--------------|
| | Α | В | С | D |
| Existing buildings renovated for efficiency | \checkmark | \checkmark | < | < |
| New buildings more efficient | \checkmark | \checkmark | < | < |
| District heat in high-density areas, powered by 70 MW CCGT | \checkmark | ~ | | |
| District heat in industrial park, powered by30 MW CHP | \checkmark | ~ | < | < |
| Increased vehicle efficiency; 7% EV | \checkmark | > | < | < |
| 24 MW photovoltaic installation | | \checkmark | < | |
| 20 MW biomass facility, partially replacing coal | | \checkmark | | |
| 10% biogas blend for CHP and (if used) CCGT | | \checkmark | \checkmark | \checkmark |
| 37 MW wind | | \checkmark | \checkmark | |
| 70 MW biomass/coal facility | | | \checkmark | \checkmark |

Source: City of Holland, Michigan, 2011. Holland Community Energy Efficiency and Conservation Strategy.



How many scenarios?

Have a business-asusual (BAU) scenario and at least two that reflect active changes. More is OK, but try to use as few as possible.

The scenarios should be different enough from each other that the public can easily differentiate them

All active-change scenarios should be improvements over BAU



How far will our money take us?

- Your goals should drive your scenarios, not costs
 - Scenario outcomes will help you shape the conversation on costs and benefits next, and budget and finance later
- More equitable scenarios may require more upfront investment, because more people receiving more kinds of benefits.
- "Cost-effectiveness" aim for more inclusive definitions
 - Financial return on investment
 - Monetized externalities (social cost of carbon) integrated into cost test – "societal benefit"
 - [Metric] / \$ invested GHG emissions reduction, % income saved through reduced energy burden



Who is impacted? Distributional parameters

- *Who* is impacted by actions is just as important as the kinds of actions selected. •
 - Costs who pays?
 - Direct benefits who sees financial (e.g. bill savings) and non-financial benefits (e.g. home comfort and indoor health) from action
 - Indirect benefits jobs created, increased local investment, outdoor air quality, etc.
- If you have equity indicators and objectives, select scenario parameters and modeling tools that can influence and assess distributional impacts:
 - Geography
 - Race
 - Income ٠
 - Other frontline or vulnerability categories ٠
- Include explicit distributional parameters in action design:
 - First-come-first-served ٠
 - Geographic targeting
 - Means-tested •
 - Performance/outcome-based GHG reduction, energy cost burden reduction



Distributional design of scenarios – metrics matter

| Action design type | | EQUALITY-FOCUSED | EQUITY-FOCUSED | |
|--|------------------------------|--|--------------------------------------|--|
| Example metrics used to prioritize action delivery | High energy consumption | Population distribution | High energy burden | |
| Example programs | Utility appliance rebates | Programs with equal budget per city ward | Weatherization Assistance Program | |



Example: poverty reduction in Chicago

| | Urban Opportunity Agenda | | Strategy Calculator Strategies Resources About | |
|----------|--|--|--|---|
| | Chicago, Illinois 👻 Map Calculator | Summary Report | 🔗 Share 📑 Print back to top | <i>How it could be done:</i> A 4% increase in public transit access to jobs requiring an associate degree or less would result in 10,732 newly accessible jobs. If |
| Indicato | Reducing poverty by 25% would bring people out of poverty. Poverty Reduction Goal: | 115,350 P | Poverty Reduction Strategies | 20% share of those newly accessible jobs would go to people living below poverty this strategy would reduce the poverty gap by \$67M. |
| Actions | Attract + Create Jobs: Energy + Water Efficiency Jobs Household Expense Reduction Leveraging Infrastructure Investment Jobs | 6% The 0.4% clo 2% Chi 2% Chi | e portfolio of strategies below could generate \$656M towards sing a \$655M poverty gap needed to reduce the poverty rate in icago, Illinois by 25%. pose a poverty reduction goal and customize the strategies to fine | Percent of increased public transit access to jobs requiring an associate degree or less |
| Actions | Food Security Jobs: Workforce Development: Mining the Waste Stream Affordable Infill Rental Housing | 0.9% tun 7% 0.1% 3% | bb Access + Transportation 3% | Created Job Distribution Gain in accessible jobs: 10,732 |
| | Total Poverty Reduction: | 25% Stra shu trar eas | ategy: Improve access to jobs with increased transit, rideshare, employer ittles, and more. In addition to benefiting low-income workers, expanding isit access benefits employers by widening the work pool, and making it ier and less costly to get to work helps families of all income levels. ier customize strategy | Share of newly accessible jobs going to people below poverty 20% |
| | | At | ttract + Create Jobs 6% | Assumed Wage \$15/hour |
| | | Stra pair pec | ategy: Channel future job growth in the region, specifically growth in well- d entry level jobs, to areas where those jobs are more accessible to sple in poverty. extract customize strategy | Poverty Gap Reduction: \$67M Distributional design |



Modeling scenarios

Models take you from baseline to potential futures





Some free modeling tools

| ТооІ | Provider | Function |
|---|---|---|
| Avoided Emissions and Generation Tool (AVERT) | EPA | Estimates pollution and GHG impacts of energy-efficiency and renewable-energy policies. State, city, or zip-code level. |
| Benefits Mapping and Analysis Program (BenMAP) | EPA | Estimates pollution-related deaths and illness, and associated economic costs, from air-quality data. Resolution same as CMAQ data, but can be aggregated to larger units. |
| Co-benefits Risk Assessment Health Impacts Screening and Mapping (COBRA) | EPA | Estimates pollution-related deaths and illness, and associated economic costs, avoided for energy-efficiency and renewable-energy policies. County, state, regional, or national. |
| Climate Action for Urban Sustainability (CURB) | C40, World Bank | Estimates GHG emissions from energy-consumption and waste-production data. (Downscaled default inputs are provided.) Estimates emission reduction from selected policies. City level. |
| Grid Project Impact Quantification Screening Tool (GridPIQ) | Pacific Northwest National Laboratory | Projects impacts of grid projects that change load profile. Impacts include emissions, and peak characteristics and other changes to load dynamics. |
| Economic Tool for Rapid Assessment of City Energy (TRACE) | World Bank | Estimate cost and energy savings and avoided emissions from a variety of GHG emission-reduction actions. |



Choosing modeling tools is all about inputs and outputs



The big-picture goal is to show how each set of actions leads to a different future—but all the modeling options can be confusing.

The trick is to look at one tool at a time, and to think of each in terms of its inputs and outputs...







Think of models as inputs becoming outputs





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Models have different strengths and requirements

What it is

What it requires

GeneralUnderlying logic applies in many placesWillingness to make assumptionsand situationsand interpretations

Realistic

Underlying logic reflects actual causes and effects driving the modeled phenomenon

Contextual info regarding local dynamics and interactions

Precise

Model makes specific, numerical predictions

Precise, accurate baseline data



Models can be two but not all three





Generalism and realism are most useful for scenario planning

Precise is nice, but...

- Hard to get good input data •
- The future is unpredictable •
- Direction and rough magnitude of • change is often sufficient





Predicting direction and rough magnitude of change can be sufficient

| Health Outcome/ Determinant | | Impact (Direction and Extent) | Likelihood | Distribution | Quality of Evidence |
|-----------------------------|--|--|--|---|------------------------|
| Bu | ildings and Energy | | | | |
| : | Obesity, diabetes and other chronic diseases Respiratory and cardiovascular diseases and hospitalizations Negative health outcomes of contaminated surface water and drinking water Mental health | ▼ ▼▼▼ ▼ ▲ | Possible Likely Possible Possible | Low-income residents impacted more Residents living in the pathway of power plants impacted more Residents living near power plants impacted more Low-income residents impacted more | * *** ** ** |
| Tra | ansportation and Land Use | | | | |
| : | Respiratory and cardiovascular diseases and hospitalizations Obesity, diabetes and other chronic diseases Mental health Neighborhood safety | | Likely Likely Possible Possible | Residents located near major roads impacted more Residents using non-auto mode share impacted more Residents using non-auto mode share impacted more Residents of livable, walkable neighborhood impacted more | *** *** ** ** |
| W | aste and Recycling | | | | |
| • | Respiratory and cardiovascular diseases and hospitalizations Waterborne disease outbreaks and health outcomes of contaminated surface and drinking water | •• | Possible Possible | Residents living in the pathway of landfills or power plants impacted more Residents living near landfills impacted more | ** |



Generality and realism both require stakeholder participation



Willingness to make assumptions and interpretations



Stakeholders' comfort with simplifications and inferences

Realistic models



Contextual info regarding local dynamics and interactions



Stakeholders' perspectives and expertise



Some questions to ask when evaluating modeling tools

Can I get the inputs? Can I use the outputs?

Does it provide default data? Is it easy to customize?

How granular is it? How granular do I really need?

Do I understand the underlying logic? Can I explain it?

How current is it? Is it on a regular update schedule? Will it be available in five years?

Does the provider provide live support?



Models are not everything





Discussion: Developing & modeling scenarios

What challenges with developing or modeling scenarios have you encountered or do you anticipate encountering?

Case study – Using Scenarios for Stakeholder Engagement

Carbon Free DC 2050

Kate Johnson Chief, Green Building & Climate Branch Urban Sustainability Administration Department of Energy & Environment

Pathways Toward a

Safe Equitable Livable Accessible Prosperous Healthy Resilient

+ Zero Carbon DC

Current Emissions



7.3M tons of carbon (2017)

CITYWIDE EMISSIONS AND TARGETS



A Next Step in City Planning

2013 Sustainable DC Envisioned a 20 year citywide plan for sustainability



2014

moveDC Set a 25 year vision for the District's transportation system



2016 Climate Ready DC Identified resilience strategies to address key climate risks



2018 Clean Energy DC Outlined a roadmap to achieve 50% GHG reduction by 2032



2019 SDC DC 2.0 Updated the 2013 plan, recommitting to innovative and inclusive ways to meet sustainability goals by 2032



2020 Net-Zero Carbon Strategy Will chart the District's pathway to become carbon neutral by 2050



A Community Vision

In 2050, all District residents...

- Have a home to live in that is healthy, safe, and affordable to keep comfortable;
- Get around using convenient, reliable, safe, affordable transportation options;
- Can meet their daily needs within an easy walk/roll of their home;
- Participate in and benefit from a green economy and green jobs;
- Are prepared for the impacts of climate change and have the tools to live green

How Do We Get There?

Our Approach

The community tells us what goals we're solving for.

The technical assessment tells us what systems we must change.

The community identifies what we'll need to tackle in order to meet these targets.

And the policy roadmap will identify what we need from policies to meet both our carbon and equity goals.



GHG Emissions (MMT CO₂e)



Key Milestones

2040: 70% of existing homes are all-electric



Equity & Resilience Evaluation Criteria



Health & Wellbeing Affordability

Jobs & Economic Development



Questions?



Using the Scenario Calculator

Our "test exercise" scenario calculator tool

| | Energy Pathways for Miami Florida | | | | | | |
|------------|--|--|----------------------------------|--|--|--|--|
| | About the Tool This tool allows you to design energy pathways in Miami Florida. It covers outcomes of energy efficiency and solar investments within the residential and corpowered by Greenlink Analytics trusted professional knowledge, using industry wide assumptions and sample outputs created by Greenlink's ATHENIA models. | | | | | | nents within the residential and commercial sector. This tool is eated by Greenlink's ATHENIA model. |
| | How to use | You can create your own energy future by inputting the value | | es in the 'ACTION' Residential 17,757,284 | cells. After entering your Commercial 13,707,397 | target values, you You can change | r report card will give a deeper breakdown of the impact. these values to reflect your own city's energy consumption. |
| | | Miami's Current Natural Gas Consul | mption (MMBTU) | 3,369,529 | 2,628,476 | | |
| | | | Energ | y Efficiency | | | |
| 7 . | Direct All Energy Efficiency Investments | | | Yes | | | |
| , i | ACTION | | | | IMPACT | | |
| | Residential Potential Achieved 100% | | Residential Potential Achieved | | 670,000 | # of homes cutting electricity in half | |
| | | | ACTION | | | IMPACT | |
| | Commercial Potential Achieved 100% | | Commercial Potential Achieved 19 | | 19 | kWh-saved per sqft | |
| | | | | | | | |
| 1,1 | | | | So | lar Power | | |
| 4 | | | ACTION | | IMPACT | | |
| | Residential Solar Power 100% | | 100% | Residential Solar Potential Achieved | | 3,360 | Homes Adding Solar |
| | | | ACTION | | | | |
| | Commerical Solar Power 100% | | Commercial | Commercial Solar Power Achieved 6,5 | | 6,510 <i># Cars off the Road each Year</i> | |

| Your 2030 Pathway Report Card | | | | | | |
|----------------------------------|---|-------------------------------|--|--|--|--|
| Cost Overview | 2030 Clean Energy Summary | , | | | | |
| Total Investment \$3,690,000,000 | Energy Demand Met by Efficiency | 28% | | | | |
| Benefit-Cost Ratio 0.4 | Commercial Solar Capacity Installed (MW) | 95 | | | | |
| Net Jobs Created 33,100 | Avoided Climate Damages (\$) Metric Tons CO ₂ Avoided (2021-2030) | \$1,042,000,000 18,855,000 | | | | |

Source: Greenlink Analytics. Links to scenario calculators for <u>all 12 Level 1 cities here</u>.



Wrap-up

Homework

(all participants)

1. Share your feedback on this session (5 minutes) –

- respond to the poll at <u>https://bit.ly/broadly_feedback_2</u>
- 2. We will send custom city <u>scenario calculators</u> this week (one for each Level 1 city). Use one calculator (your city's, or one for a city a similar to yours) to explore different scenario options and their impacts. Based on your explorations, choose:
 - One distributional program design for residential efficiency Business-as-usual vs additional lowincome investments
 - The level of potential achieved (0-100%) for four intervention types
 - Residential energy efficiency
 - Commercial energy efficiency
 - Residential solar
 - Commercial solar



Homework

(Level 1 participants only)

- 3. Choose an intervention scenario and indicate your chosen variables in your scenario calculator. Email a copy of the calculator tool (with your settings saved) or a screenshot of it to Yeou Jih at yjih@greenlinkanalytics.org by June 3.
- 4. Before the next session, Greenlink will provide you with projected 2030 indicators and maps for your city resulting from two scenarios—your selected "intervention" scenario and a "business-as-usual" scenario.
- 5. In preparation for the next session, **examine the scenario outcomes and think** about what they would mean for your community.



Session 3 – June 25, 3:30-5pm EST

Topics

- Interpreting scenario outcomes
- Evaluating and communicating scenarios
- Turning scenarios into equitable policies and actions

- Make sure the appointment is on your calendar
- Register in advance at <u>https://wri.zoom.us/meeting/register/tJYtduqsqD4qHNUA</u> <u>EjjhukVuKfZLAGYP4WJg</u>



Equitable Clean Energy Planning Resource List

Resource and Reading List

Broadly Beneficial Clean Energy Planning



This list compiles tools, datasets, reports, frameworks, and other resources that should be useful to city governments engaging in inclusive clean-energy planning. The list is necessarily incomplete, but the gold-highlighted items are particularly recommended.

| Resource | Provider | Category | Туре | Description |
|--|--|----------|------------------|---|
| City and County Energy Profiles | DOE | baseline | data | Modeled state- and county-level data for electricity and natural gas consumption, vehicle use, and emissions. |
| Energy Poverty and Equity Explorer | CUSP | baseline | data | Income, housing, demographic, and energy-burden data at neighborhood-scale for Canadian cities. Based on data from Statistics Canada. |
| H+T Affordability Index | Center for Neighborhood Technology | baseline | data | Affordability of housing and transportation at a variety of spatial scales, down to US Census block. Based on census housing-cost data and modeled transportation-cost data. |
| Low-Income Energy Affordability Data (LEAD) | DOE | baseline | data | Income, housing, and energy-expense data at US, state, county, city, and census-tract levels. Data from US Census Bureau and Energy Information Administration. |
| State and Local Energy Data (SLED) | DOE | baseline | data | City-level energy use (by sector), energy expense, and demographic and income data. |
| State and Local Planning for Energy (SLOPE) | NREL | baseline | data | Modeled energy-efficiency potential, renewable generation potential, electricity and natural gas consumption BAU projections, levelized cost of energy (LCOE) projections, and population projections on a variety of spatial scales. Models based on numerous government- derived datasets and models. |
| Cities Leading through Energy Analysis and Planning (Cities-LEAP) | DOE | baseline | resource list | Guidance and modeled data supporting city adoption of clean-energy policies and programs. |
| Local Clean Energy Self-Scoring Tool | ACEEE | baseline | tool | Interactive tool for evaluating a community's existing energy policies against the ACEEE's 2019 City Clean Energy Scorecard. |





See you in a few weeks!

Thanks to our partners:





anadian urban ustainability practitioners

And advisors, reviewers and researchers:

- Allison Ashcroft, Canadian Urban Sustainability Practicioners
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- Samantha McDonald, Greenlink Analytics



Q&A & Additional Discussion