Accelerating Zero Energy Communities of the Future

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IDEA2019

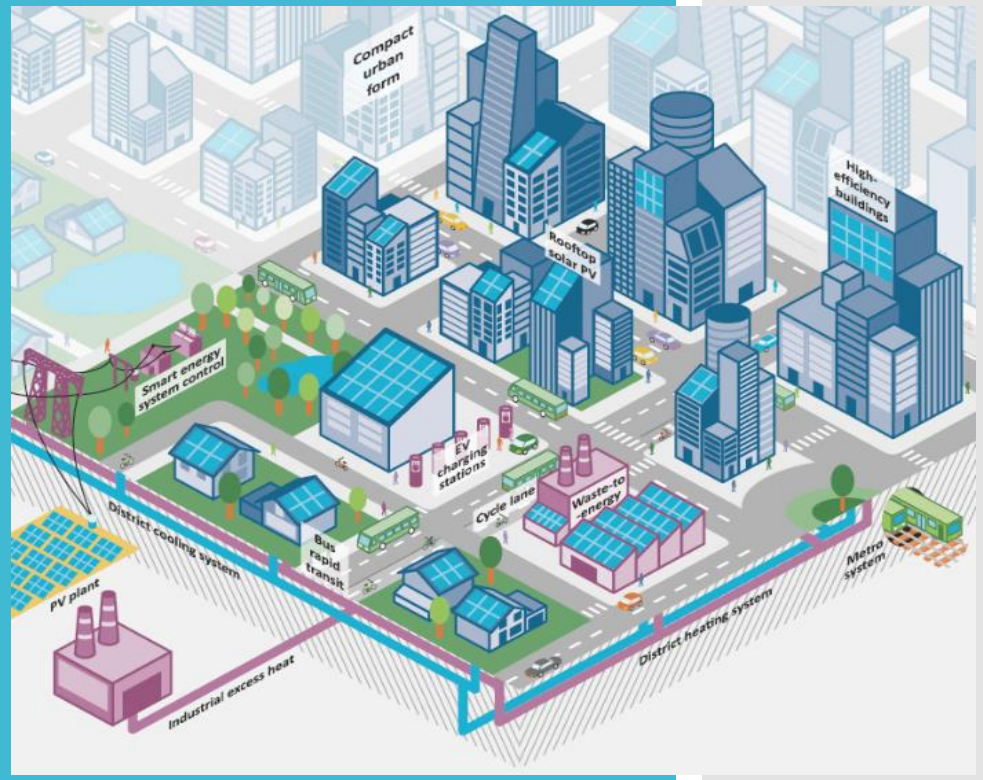

Image: IEA.org

The Mission

Innovative

Reliable

Affordable

Equitable

Resilient

Engaged

HEALTHY

Connected

Ecological

Secure

Zero Energy Buildings are Here….

and Many More are Coming

C40 CITIES

Cities Networks Programmes Research

Media

19 Global Cities Commit to Make New Buildings "Net-Zero Carbon" by 2030

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Regulations and planning policy will also target existing buildings to make them net-zero carbon by 2050 to ensure cities deliver on the highest goals of Paris Agreement.

Copenhagen, Johannesburg, London, Los Angeles, Montreal, New York City, Newburyport, Paris, Portland, San Francisco, San Jose, Santa Monica, Stockholm, Sydney, Tokyo, Toronto, Tshwane, Vancouver & Washington D.C. make bold commitment ahead of Global Climate Action Summit.

London, UK (23 August 2018) – Today, 19 pioneering mayors, representing 130 million urban citizens, committed to significantly cut greenhouse gas emissions from their cities by ensuring that new buildings operate at net zero carbon by 2030. By signing the **Net Zero Carbon Buildings Declaration**, the leaders of Copenhagen, Johannesburg, London, Los Angeles, Montreal, New York City, Newburyport, Paris, Portland, San Francisco, San Jose, Santa Monica, Stockholm, Sydney, Tokyo, Toronto, Tshwane, Vancouver & Washington D.C. also pledged to ensure all buildings in the cities, old or new, will meet net-zero carbon standards by 2050.

Districts are Key to our Zero Energy Future

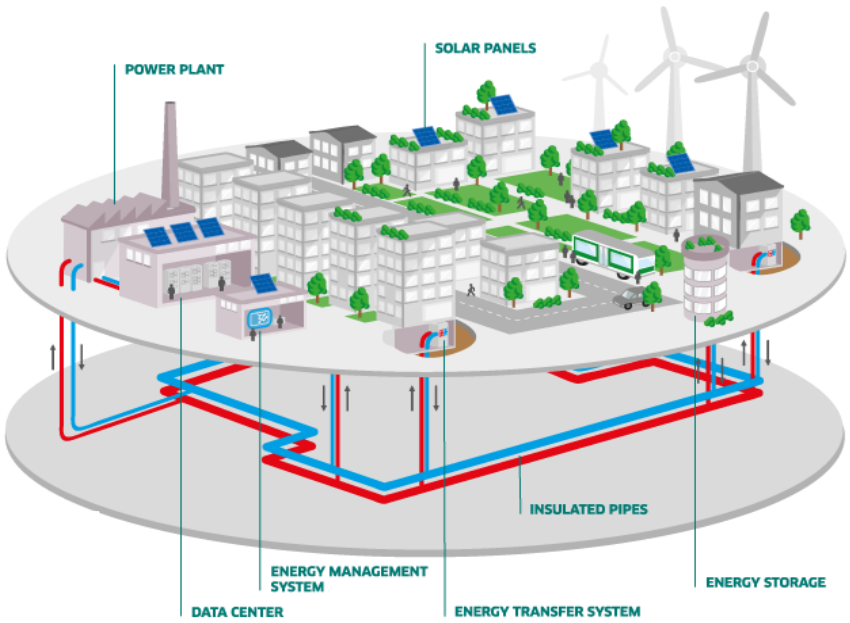

Image: Engie.com

- Economies of scale
- Shared infrastructure
- Balance across buildings
- Opportunity for enhanced “code”
- Social structures and accountability
- Large collective impact

DOE's Zero Energy Districts Accelerator

6 District Partners

- Sun Valley EcoDistrict (CO)
- Erie County Industrial Redevelopment (NY)
- St. Paul Ford Site Redevelopment (MN)
- National Western Center (CO)
- Huntington Beach Advanced Energy Community (CA)
- Catalyst Spokane (WA)

4 National Partners

Commit to provide resources and support to districts

EcoDistricts

U.S. GREEN BUILDING COUNCIL

Xcel

ROCKY MOUNTAIN INSTITUTE

National Western Center

PRESS RELEASE
For Immediate Release

September 19, 2018

City and County of Denver
Mayor's Office of the National Western Center
Jenna Espinoza, Director of Communications & Public Information
Jenna.Espinoza@denvergov.org
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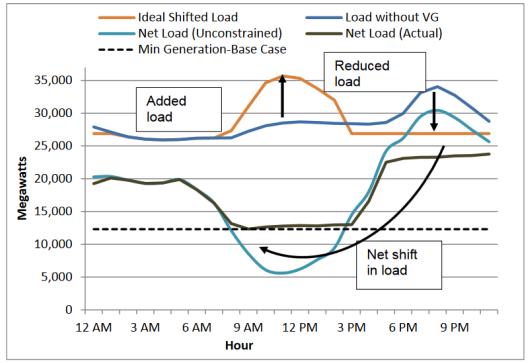
Mayor's Office of the National Western Center Announces Energy Partner

DENVER – The Mayor's Office of the National Western Center (NWCO) today announced that EAS Energy Partners (EAS) has been selected to enter into an exclusive negotiation to become the official campus energy partner of the National Western Center (NWC).

The National Western Center has set a long-term goal of becoming a net-zero energy campus, where energy consumption would be completely offset by renewable on-site energy production annually. As the campus energy partner, EAS will deliver district and renewable energy solutions while also being responsible for the long-term operation and maintenance of NWC energy systems.

The current energy concept features a sewer heat recovery system to transfer heat between the Delgany sewer main and an ambient campus wide piping distribution loop as well as a solar photovoltaic (PV) system located on the rooftops of campus buildings.

Zero Energy District Design Principles



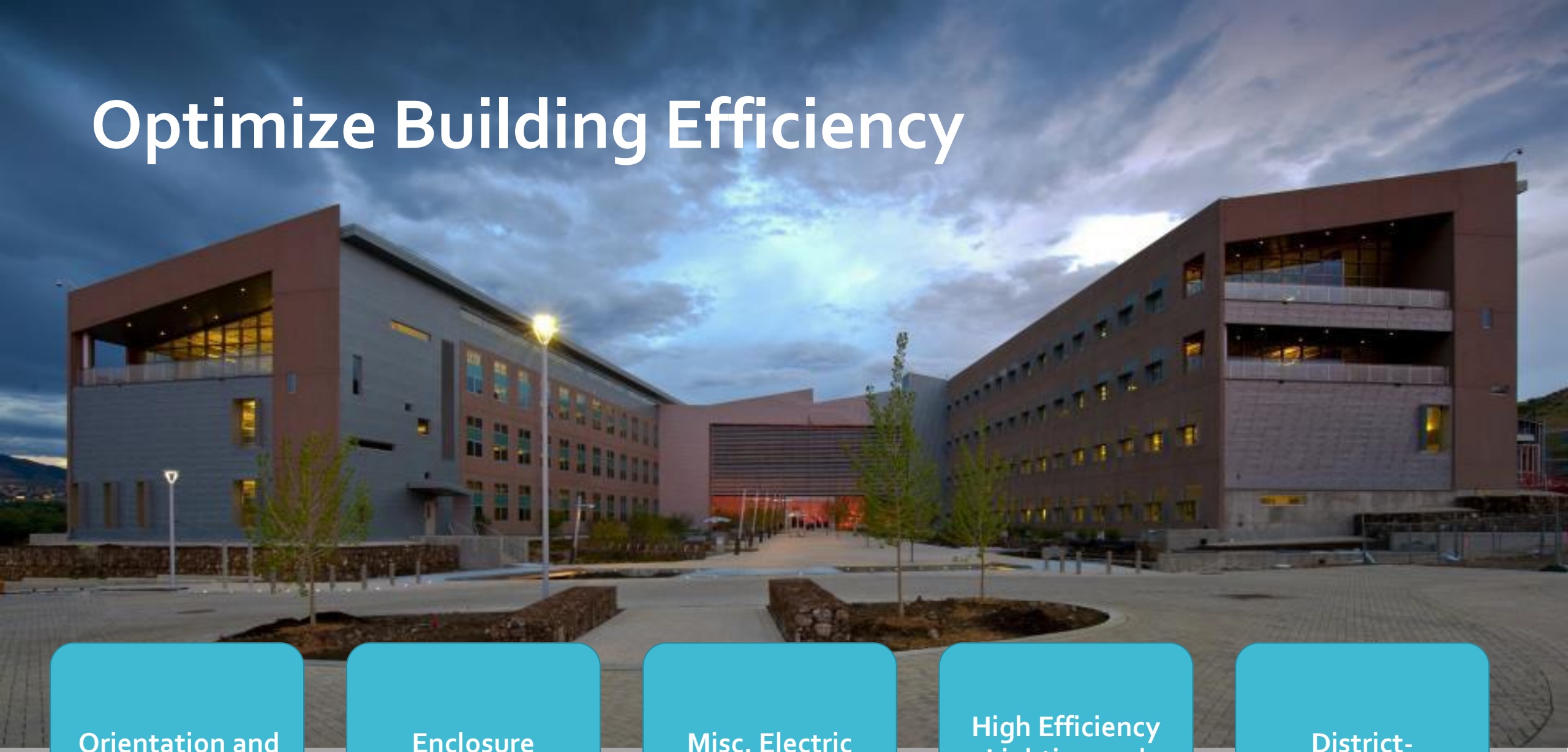
1. Optimize Building Efficiency

2. Optimize Thermal and Heat Recovery

3. Optimize Solar Potential

4. Optimize Demand Flexibility

Optimize Building Efficiency



- Orientation and Natural Lighting
- Enclosure Efficiency
- Misc. Electric Loads
- High Efficiency Lighting and Controls
- District-Connected HVAC

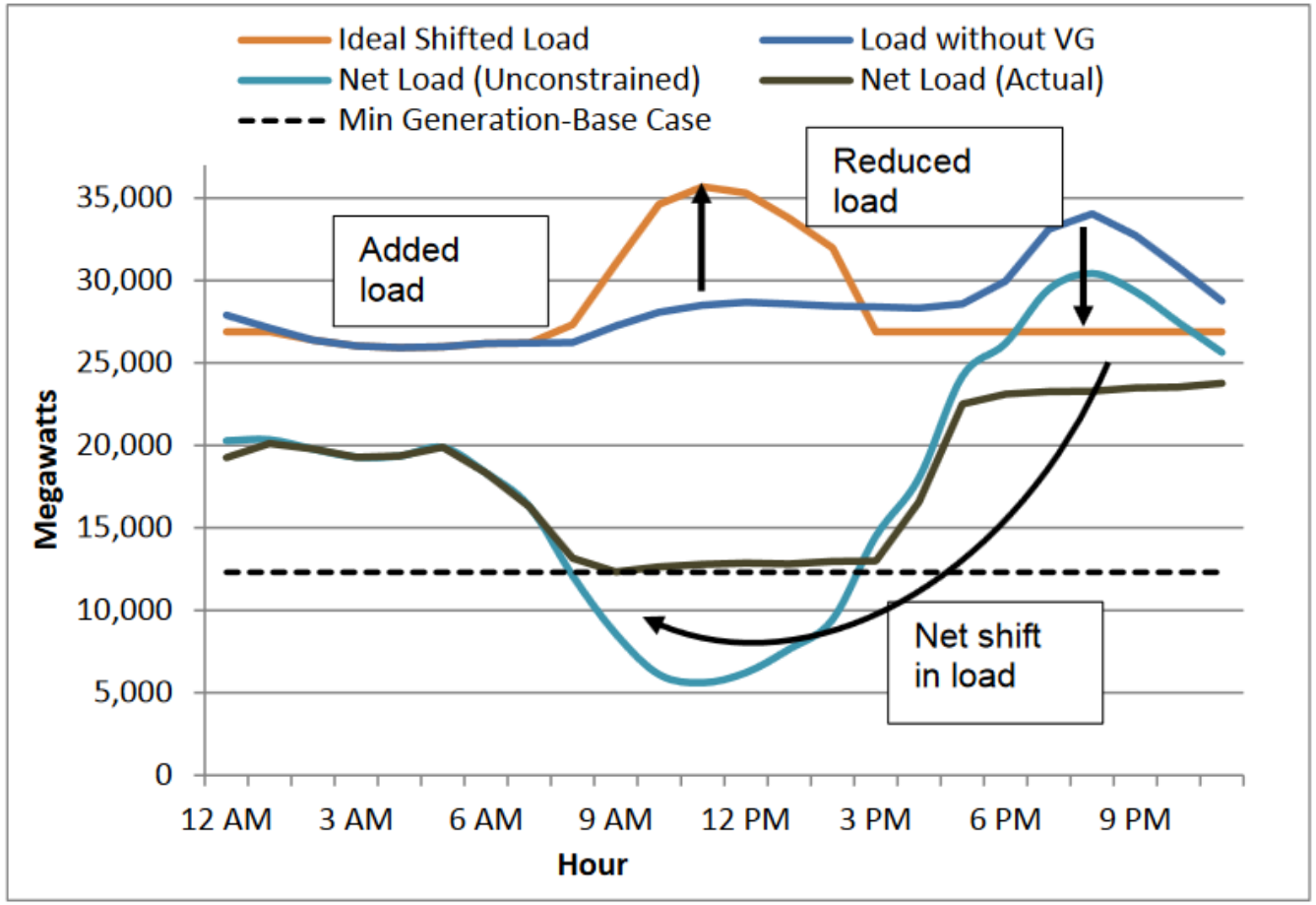
Optimize Thermal and Heat Recovery

- Industrial Waste Heat
- Data Centers
- Ground Source Heat Pumps
- Sewer Heat Recovery

Examples only, not an exhaustive list.

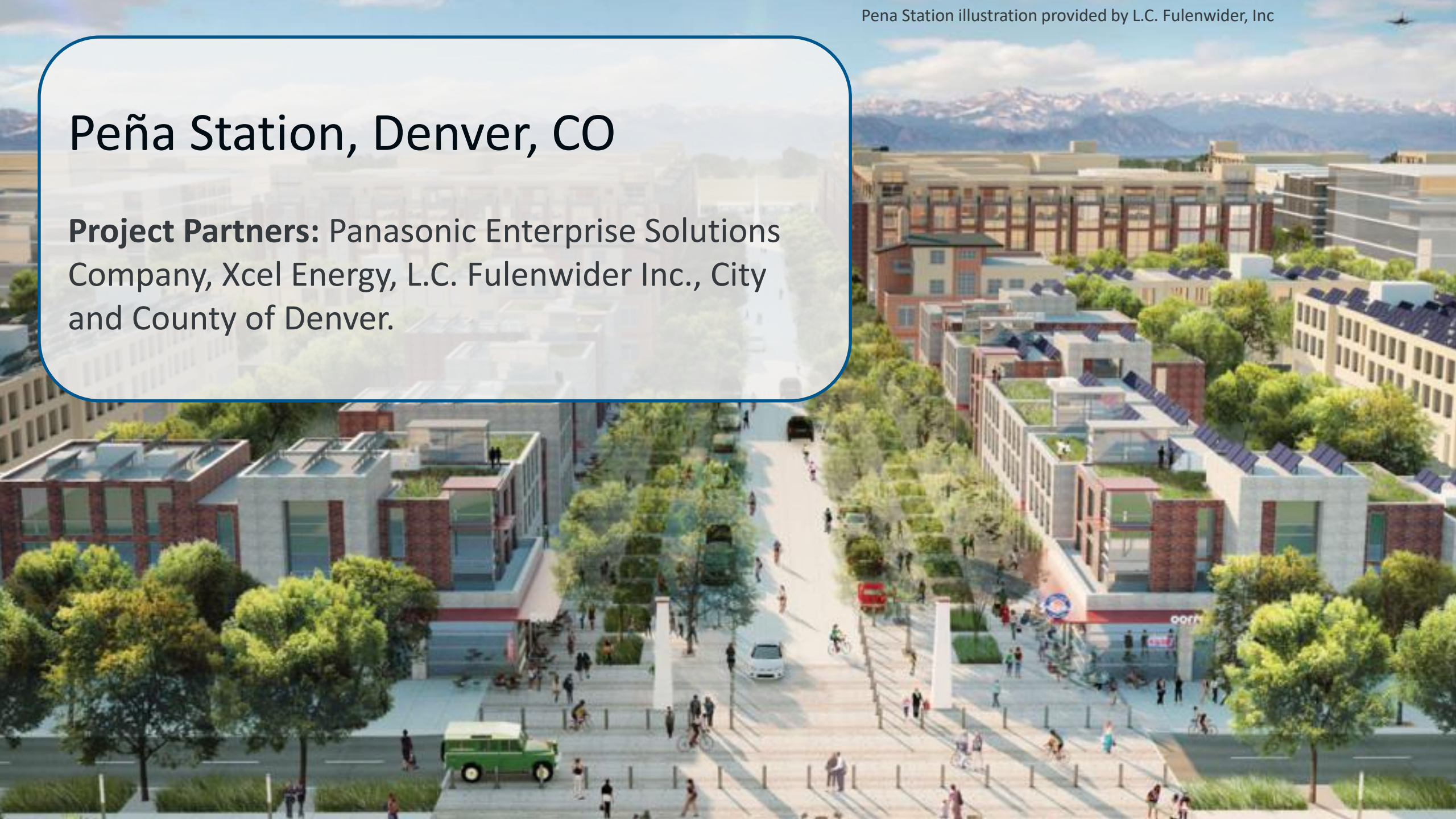
Optimize Solar Potential

- Minimize Building-to-Building Shading
- Minimize Other Systems that Require Roof Space
- Shade Parking with Solar Panels
- Improve Potential for Off-Grid Resiliency



Accommodation of increased penetration of PV by flattening the duck (increasing mid-day demand). Source: Denholm et al. 2015

Optimize Demand Flexibility



Pena Station illustration provided by L.C. Fulenwider, Inc

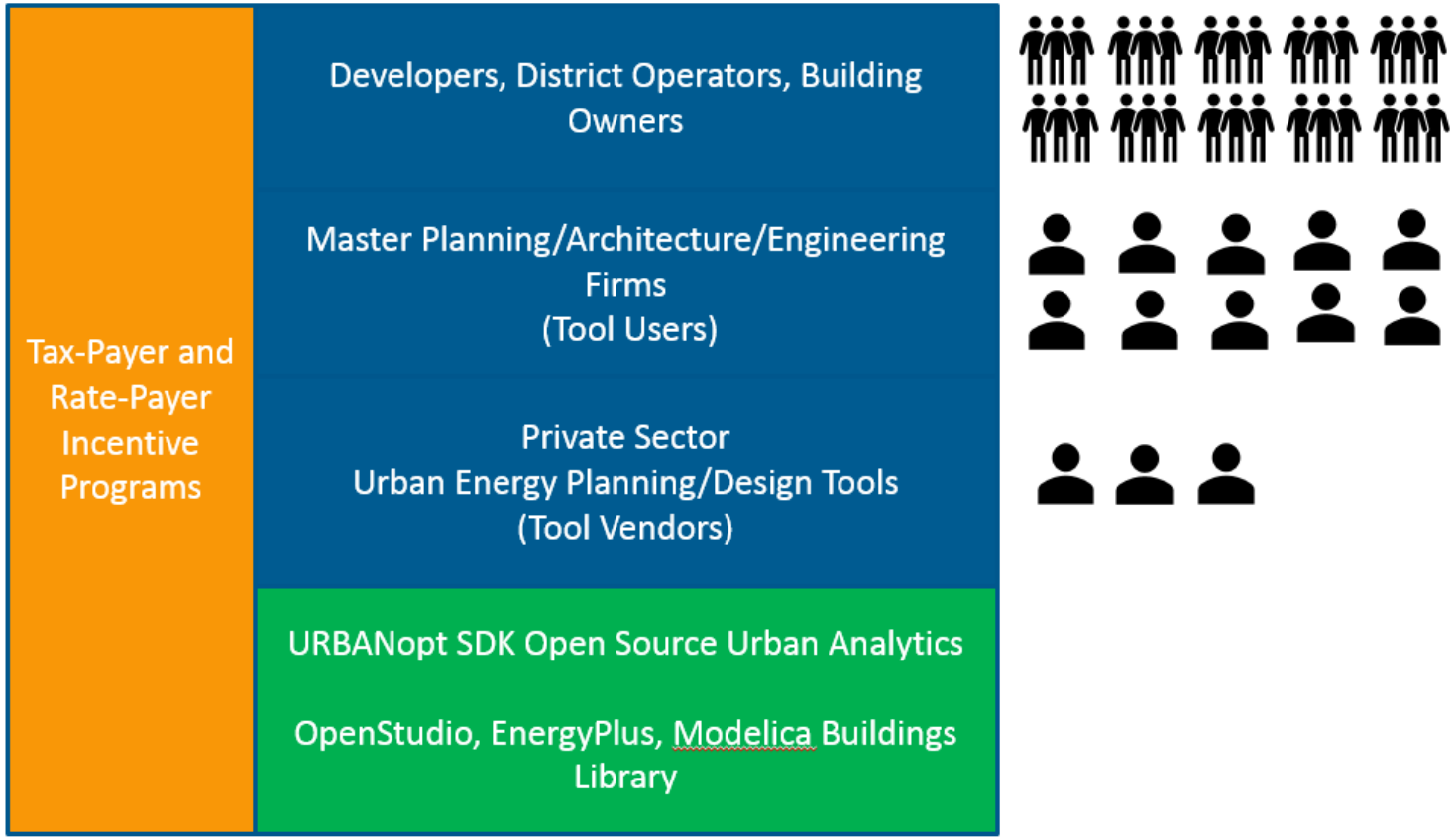
Peña Station, Denver, CO

Project Partners: Panasonic Enterprise Solutions Company, Xcel Energy, L.C. Fulenwider Inc., City and County of Denver.


W/ Batt
State of Charge

URBANopt – Advanced Analytics Platform for High Performance Buildings and Districts

- Built on top of OpenStudio® and EnergyPlus™ through new U.S. DOE investments in tools
- Modular, open source platform; "underlying analytics" that can be integrated into private sector tools

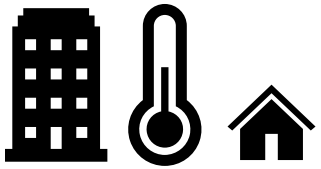


URBANopt –

Three Primary Analytics Use Cases

Design of low energy campuses and districts using advanced analytical capabilities integrated into typical planning workflows for architects and urban planners.

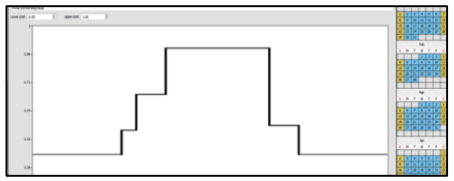
Design and optimization of grid-interactive efficient buildings (GEBs) at a district-scale in conjunction with distributed energy resources (DERs) and electric distribution systems.

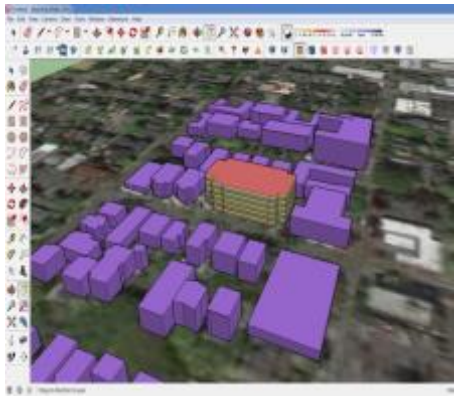


Tools for design and operation of next-generation district energy and control systems.

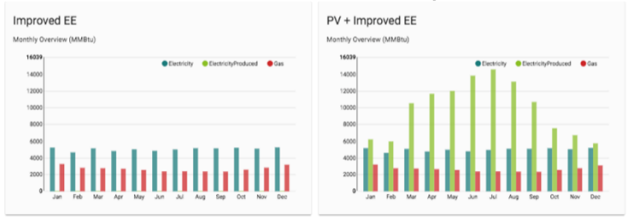
Analysis Workflows

Geometry/Building Data Input and Detailed Building Energy Model Creation

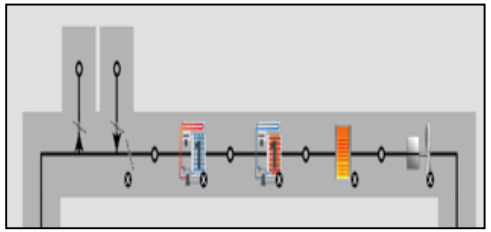




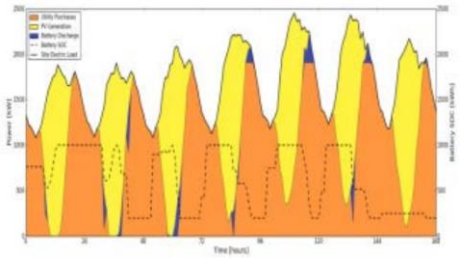
District-Scale Annual Energy Scenario Analysis



District Thermal System Analysis w/Modelica



Grid-Interactive Analysis w/ REopt/OpenDSS



Seek Answers to these and Other Questions

What efficiency and energy generation levels are required to achieve a Zero Energy District?

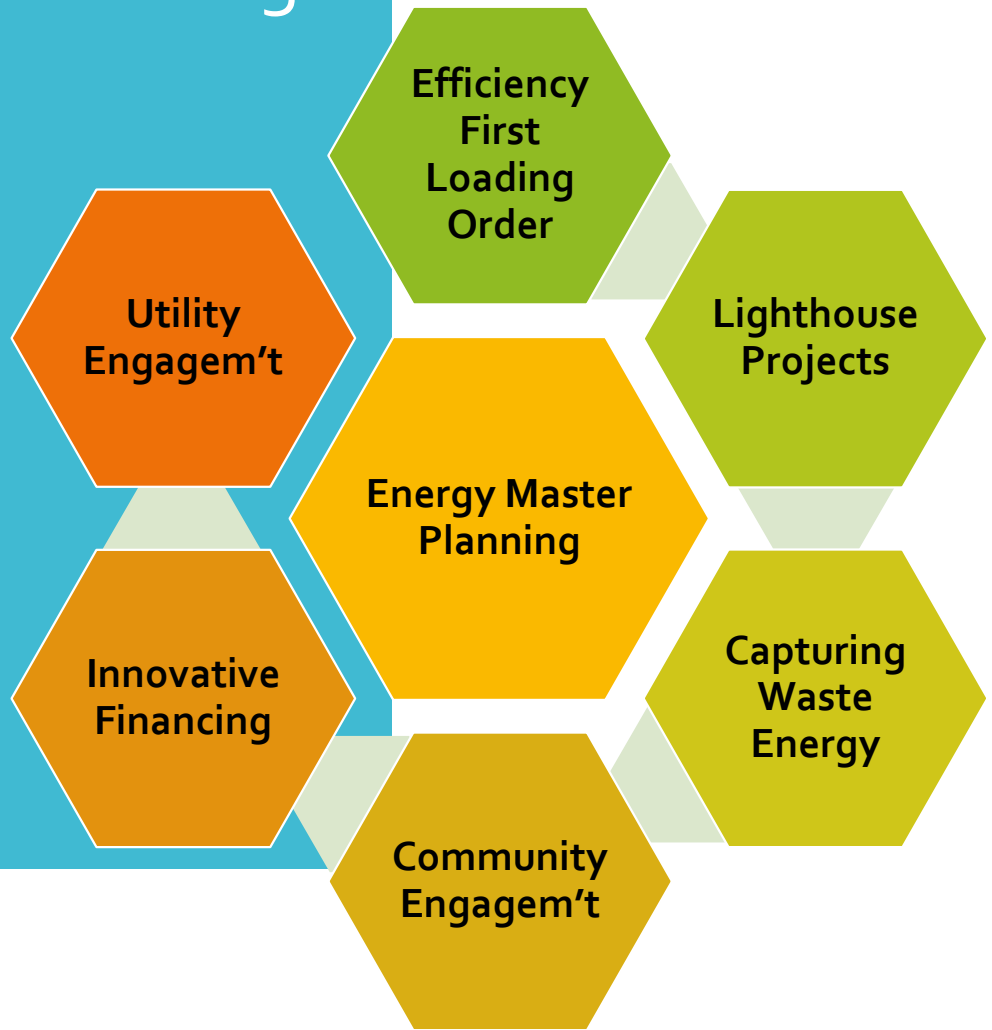
Should one central system or multiple smaller systems be used and which potential thermal network layout is best?

What impact does the efficiency, demand flexibility, and distributed generation/storage have on the electric distribution grid requirements?

URBANopt Targeted Outcomes

- **Provide accurate, transparent, and robust analytics** to support industry tools and applications for district-scale analysis.
- **Identify opportunities for additional efficiencies and cost savings** through the concurrent design, upgrade, and/or optimization of buildings, DERs, district thermal systems, and electricity distribution infrastructure.
- **Accelerate R&D** in district and campus level energy-efficiency and grid-interaction technologies and strategies.

High Performance Districts Planning Guide



- Focus on Zero Energy principles that support high performance district projects
- Document best practices from Zero Energy District Accelerator and other advanced energy community projects
- Suggest what analysis is most valuable at what stage
- Leverage, reference, and build on existing resources (IDEA resources, RMI, etc.)
- In development – due Fall 2019

Thank you!

Questions?