Better Buildings®
U.S. DEPARTMENT OF ENERGY

JUNE 8–11

2020 SUMMIT

A Virtual Leadership Symposium

Learn more: betterbuildingssolutioncenter.energy.gov/summit

U.S. DEPARTMENT OF ENERGY

Commercial Real Estate Meet Up

Monday, June 8th, 2020

1:00 PM – 2:30 PM ET

Deb Cloutier

RE Tech Advisors

Hannah Debelius

ORISE Fellow, DOE

Agenda

1. Welcome & Program Updates
2. Partner Updates
3. Audi Banny, IMT: Building Energy Performance Standards
4. Emma Elgqvist, NREL: Techno-Economic Considerations for EV Deployment and DERs
5. Drew Torbin, Black Bear Energy: Renewable Energy in CRE
6. Q&A and Closing

Welcome & Introductions

Deb Cloutier
RE Tech Advisors
CRE Subject Matter Expert

Hannah Debelius
DOE Fellow
CRE Lead

Andrea Doukakis
RE Tech Advisors
CRE Account Manager

Michael Powers
RE Tech Advisors
CRE Account Manager

Slido

Please go to www.slido.com

using your mobile device or web browser

Enter Event Code

#BBSummit

Select "CRE Meet-Up" from the dropdown

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#BBSummit2020

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- www.linkedin.com/company/better-buildings/
- www.linkedin.com/showcase/better-plants/

Poll #1

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New Commercial Real Estate Partners

American Family Insurance (BBA)

Hudson Pacific Properties (BBA)

Hawaiian Airlines (BBC)

Highwoods Properties (BBC)

Kilroy Realty (BBC)

MetLife Site Visit

Congratulations to our Goal Achievers!

Nuveen Real Estate

- 2.6% per year savings over 10 years
- Committed 25M square feet

USAA Real Estate Company

- 2.1% per year savings over 10 years
- Committed 12M square feet

Priority Updates

- **Priority #1:** Develop guidance/analysis from organizational energy + resilience efforts, and make connections and build regional ties for resilience partnerships spanning the public/private sector

- **Priority #2:** Leverage Better Building partner successes to drive awareness and adoption of energy efficiency in businesses beginning their energy efficiency/sustainability journey
  - Developing a roadmap toolkit that will provide organizations beginning their energy efficiency/sustainability journey with guidance using partner case studies and other industry resources.

- **Priority #3:** Promote new building technologies, validation opportunities, and results to support broader adoption

Word Cloud Results!

Poll #2 – Quick Survey

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Waste Reduction Pilot

- The Pilot was launched to address the 2.7 billion tons of industrial solid waste and more than 260 million tons of municipal solid waste the U.S. generates annually.
- DOE is working with partners to help them develop or refine goals, identify benchmarks, determine performance metrics, track performance, and validate results.
- Over 30 partners from various Better Buildings sectors are participating

Partner Updates

DWS

Climate and Resiliency Program

ULI Urban Land Institute

New and Upcoming Resources

WASH★REIT

Portfolio Improvements: Results

DWS

Climate and Resiliency Program

Zach Brown

Director, Energy & Sustainability

Rielle Green

Manager, Energy & Sustainability

Urban Land Institute

Marta Schantz

Sr. Vice President, Greenprint Center for Building Performance

New and Upcoming Resources

Embodied Carbon in Building Materials – Link
Class B/C Office Energy Efficiency – Link
Net Zero Tenant Case Study – Link

WASH★REIT

Portfolio Improvements: Results

Matthew Praske

Director of Energy and Sustainability

Poll #3

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Today's Presenters

Audi Banny
Institute for Market Transformation (IMT)

Emma Elgqvist
National Renewable Energy Laboratory (NREL)

Drew Torbin
Black Bear Energy

Submit Speaker Questions

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Audi Banny

Institute for Market Transformation (IMT)

Submit Questions
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IMT
INSTITUTE
FOR MARKET
TRANSFORMATION

Building Performance Standards

A Tool for Energy-Optimized Buildings

IMT’s Mission

IMT catalyzes widespread and sustained demand for high-performing buildings to drive toward a world in which buildings are efficiently and positively transforming our physical, social, and economic well-being.

Building Performance Standards

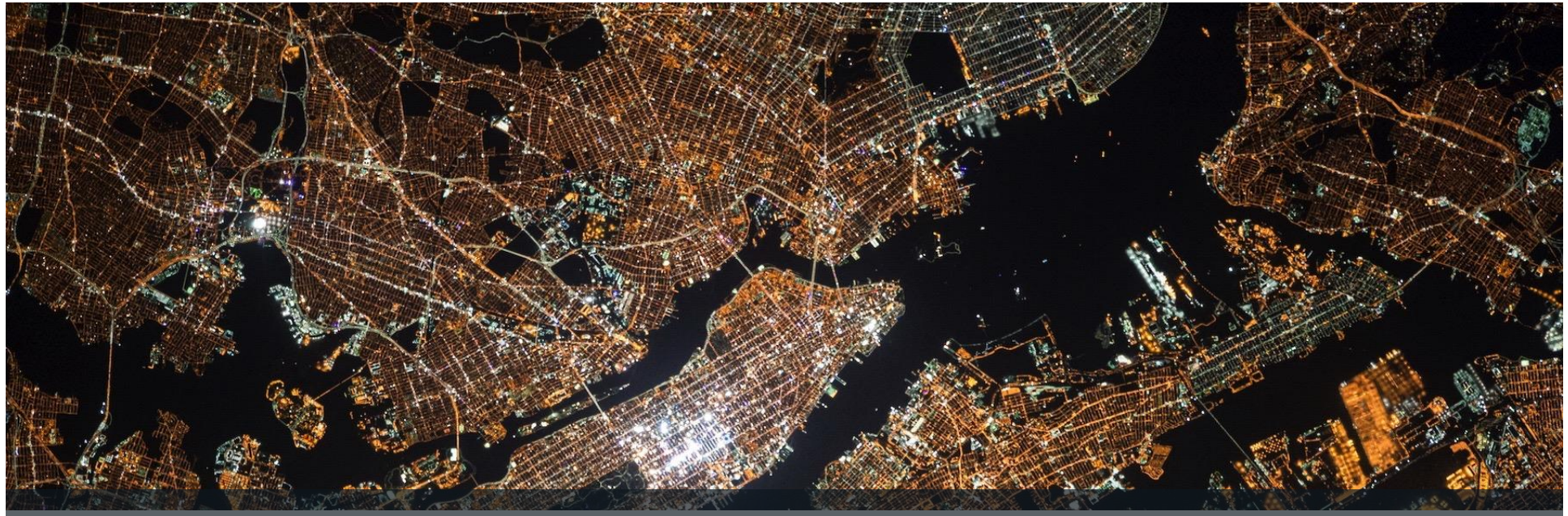
Adopted by 4 jurisdictions

Other jurisdictions nationwide viewing BPS as pathway to help meet Climate Action Goals

Establish mandates to improve energy and carbon performance levels **over the life of buildings**

This is happening now

The Future of Building Performance Standards



- CO_2 emission reductions
- Energy affordability & economic development
- Inclusiveness & equity
- Grid optimization & electrification
- Community resiliency

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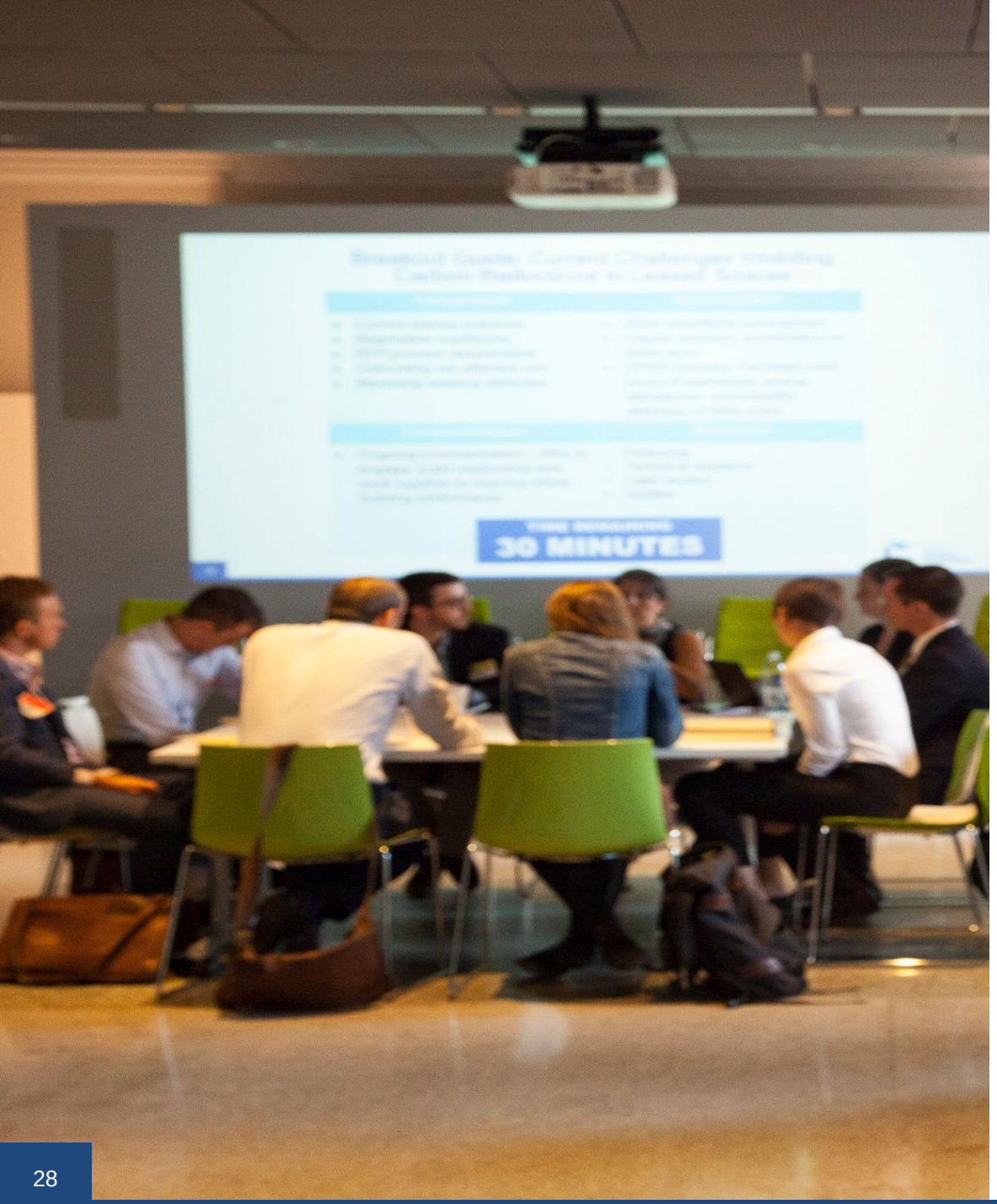

Post LL97 Passage Workshop

50 attendees:

Owners, tenants, consultants, trades, utility, city, green bank

Landlord-tenant challenges inhibiting compliance

IMT INSTITUTE FOR MARKET TRANSFORMATION

Seven Hurdles to Significant Carbon Reduction

1. Typical lease negotiations pay little attention to large-scale carbon savings
2. Misperceptions hamper productive conversations
3. Contacts are not established and maintained for long-term collaboration
4. Conversations are not inclusive
5. Mid-lease energy efficiency improvements are highly uncommon
6. Good faith tenant efforts can negatively affect carbon reduction (workspace density)
7. Alternative financing mechanism are overlooked

Adopted BPS

	Washington, DC	New York City	WA State	St. Louis, MO
Minimum Threshold Performance	Standards set no lower than median **ENERGY STAR score** (or equivalent) by building type	**CO_2e** emissions limits on a sq. ft. basis by building type	TBD, based on **site EUI**	Standards set no lower than 65th percentile **site EUI** by building type
Covered Buildings	Commercial and multifamily > 10K sq. ft.	Commercial and multifamily > 25K sq. ft.	Commercial > 50K sq. ft.	Commercial and multifamily > 50K sq. ft.
Compliance Cycle	5 years	Must meet limits annually, limits get stricter every ~5 years	5 years	4 years
Advisory Board	Defined in ordinance, specific requirements for representation	Defined in ordinance, specific requirements for representation	No	Defined in ordinance, specific requirements for representation

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Can BPS Positively Disrupt Leasing Transactions

1. Landlord drives carbon emissions awareness with tenants

a. Audit: Know how building is performing

b. Use the policy to inform tenants about the importance of energy efficiency and carbon reduction in your buildings

c. Calculate buildings carbon intensity or EUI

2. Prioritize energy efficiency before lease is signed

3. Transform traditional leases into high-performing green leases

4. Establish ongoing communications with tenants

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HIGH-PERFORMANCE BUILDING HUB

DOEE is working with IMT and partners to design a hub to support YOU through this transition by creating a platform for collaboration, innovation, capacity building, training, and technical assistance.

IMT
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IN CONSIDERATION:

- Training in high-performance building design and construction techniques
- Support for high-efficiency projects
- Direct technical assistance
- Targeted research and resource development
- Market support and development
- Opportunities for knowledge exchange and collaboration

Go to imt.org/hub to stay informed!

Leasing Lifecycle Next Steps: Integrating Efficiency to Enable High Performing Buildings

Leasing Landscape	Evaluate Resource Gaps	Training and Resources
1. Map commercial leasing tenant journey	1. Identify training and resources needs	1. Create curriculum of training, and resource development
2. Identify tenant role in achieving building performance goals	2. Assess current resource landscape	2. Create tools and resources
3. Identify needs for brokers, attorneys and lenders to incorporate efficiency in leasing transaction	3. Test needs assessment with stakeholder groups	3. Create map of current tenant energy efficiency incentive opportunities
		4. Stakeholder playbook

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Poll #4

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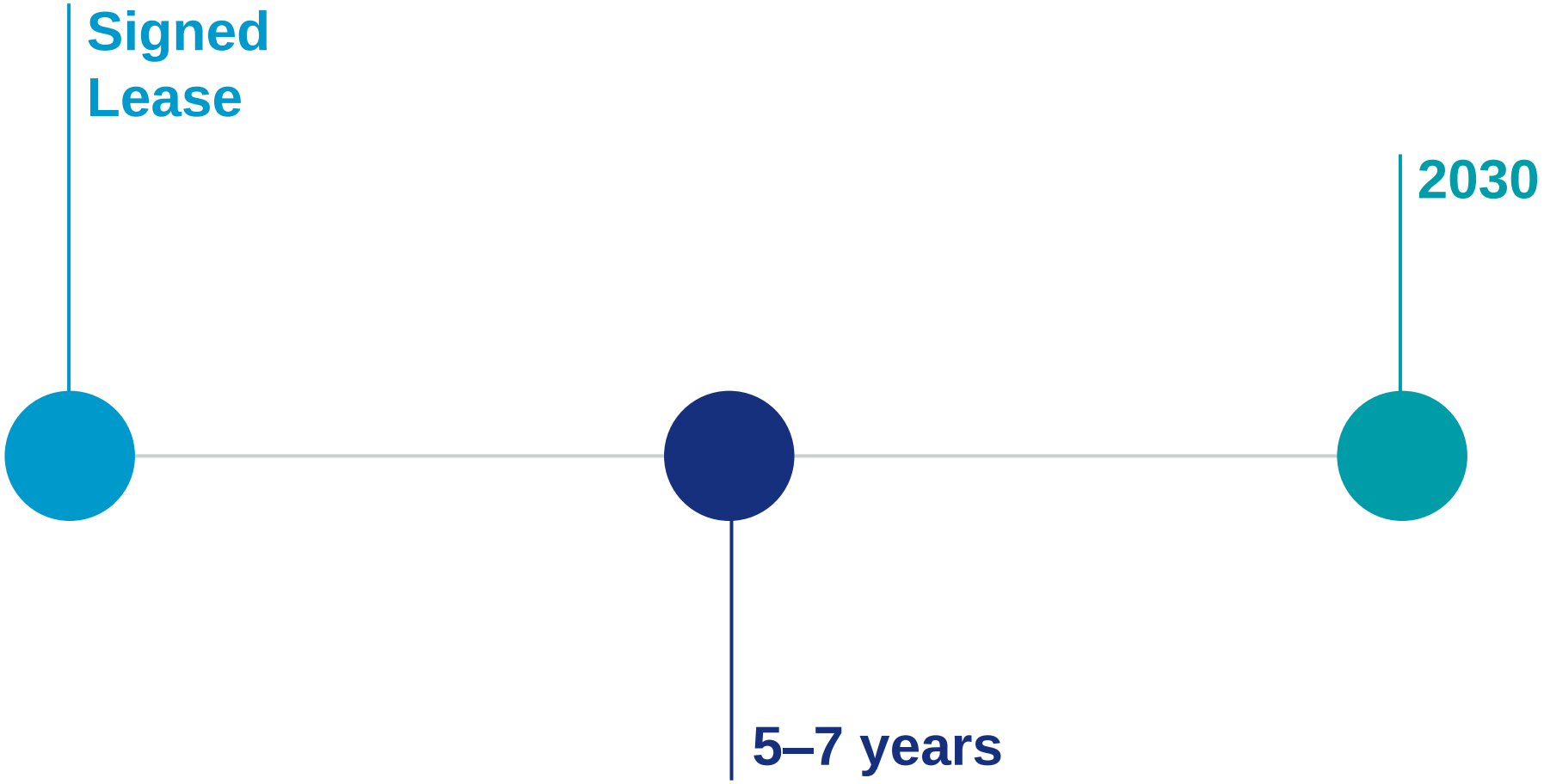

1–2 lease cycles to adopt meaningful efficiency solutions by building owners and tenants

IMT INSTITUTE FOR MARKET TRANSFORMATION

Thank you

Audi Banny
Institute for Market Transformation
Audi.banny@imt.org

Emma Elgqvist

National Renewable Energy Laboratory (NREL)

Submit Questions
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U.S. DEPARTMENT OF ENERGY

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Techno-Economic Considerations for EV Deployment and DERs

Emma Elgqvist, Researcher, NREL
Better Buildings CRE Sector Meet-up
Monday, June 8th from 1-2:30pm EST

REopt Integration and Optimization

Agenda

1. REopt Tool Overview
2. EV Load Modeling
3. REopt Analysis for EV Workplace Charging in MN Office Building
4. Related Research

Will DERs Work for Your Site?

RE Resource

Technology Costs & Incentives

Resilience Goals

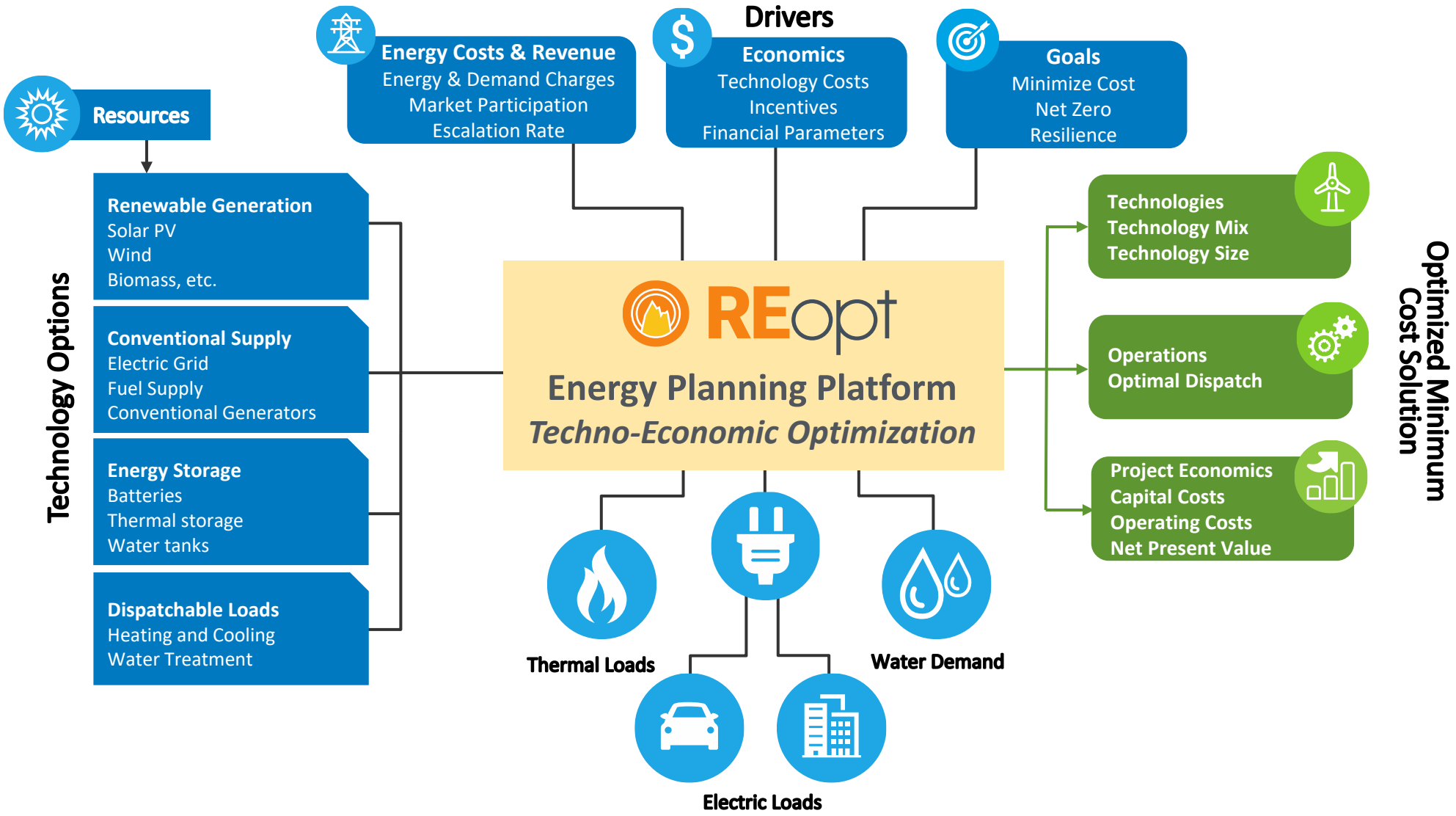
Utility Cost & Consumption

Financial Parameters

Many factors affect whether distributed energy technologies can provide cost savings and resilience to your site, and they must be evaluated concurrently.

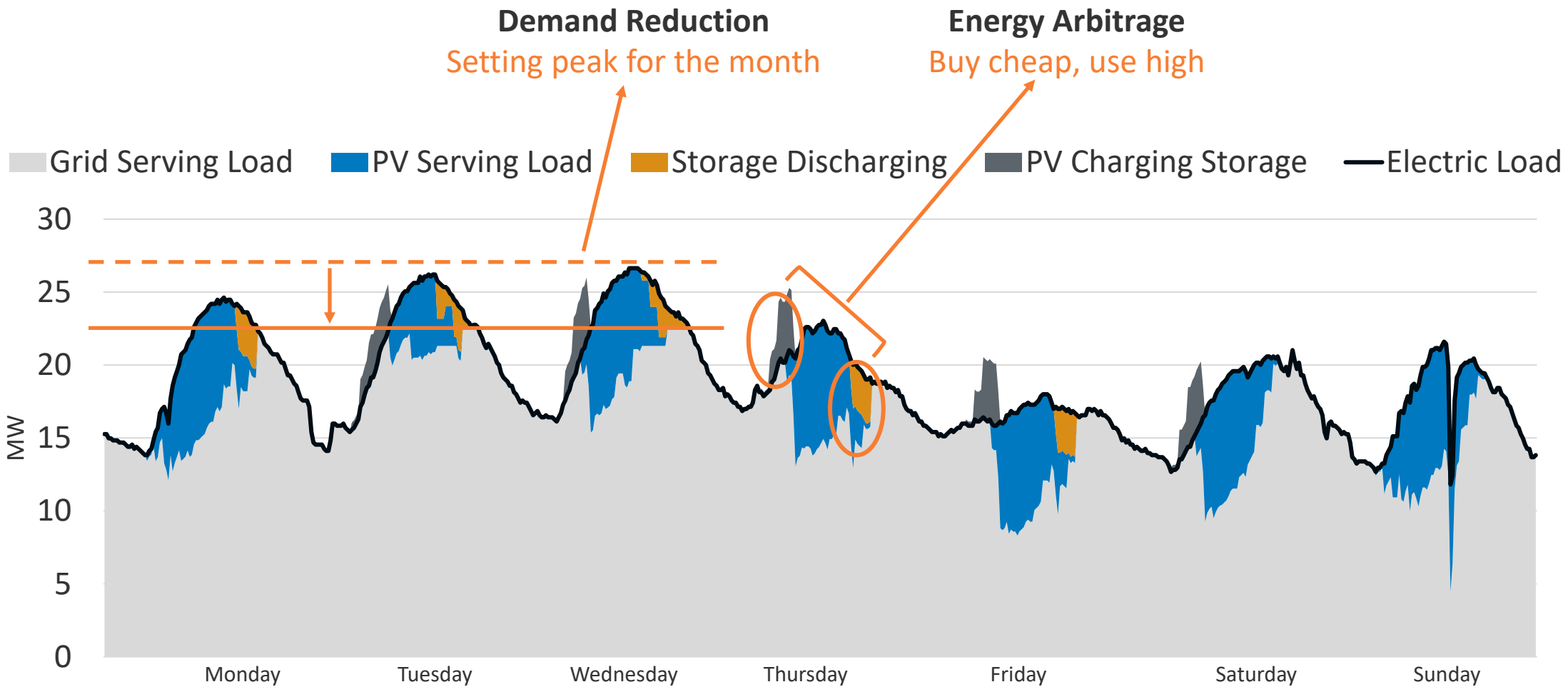
REopt Energy Planning Platform

Formulated as a mixed integer linear program, REopt provides an integrated, cost-optimal energy solution.



How Does REopt Work?

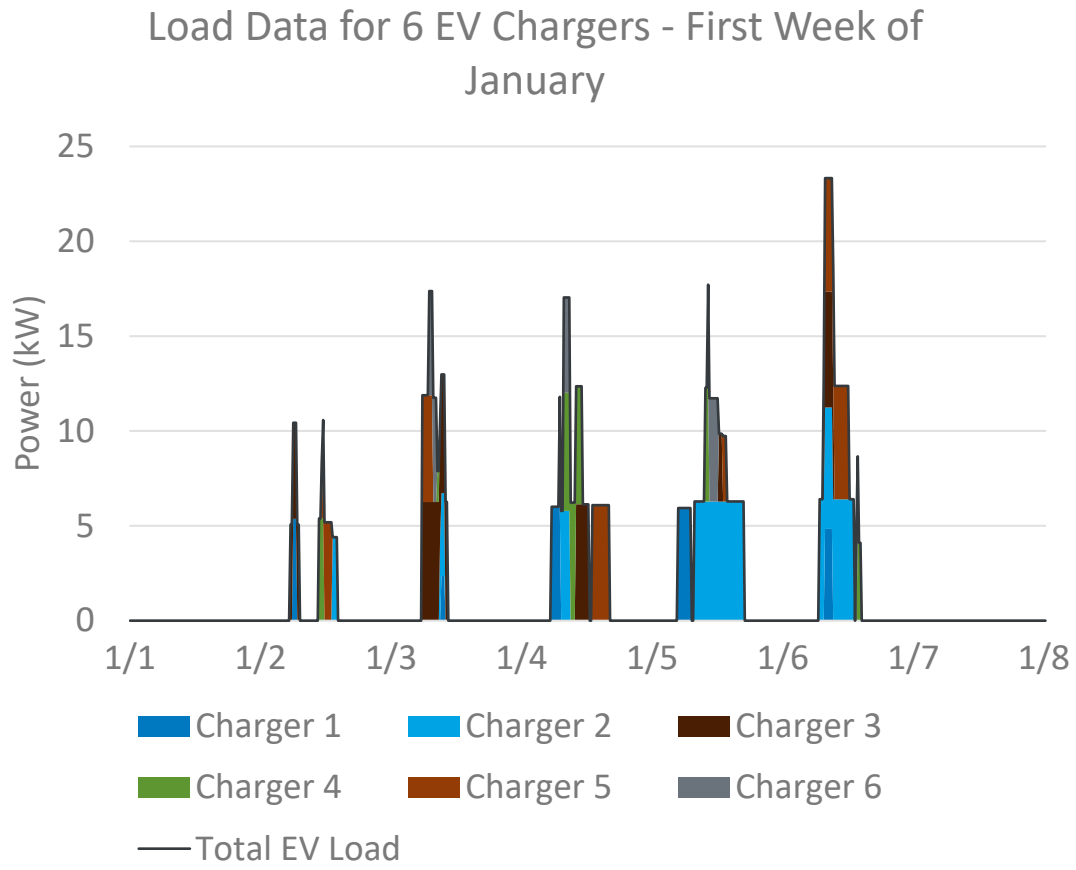
REopt considers the trade-off between ownership costs and savings across multiple value streams to recommend optimal size and dispatch.



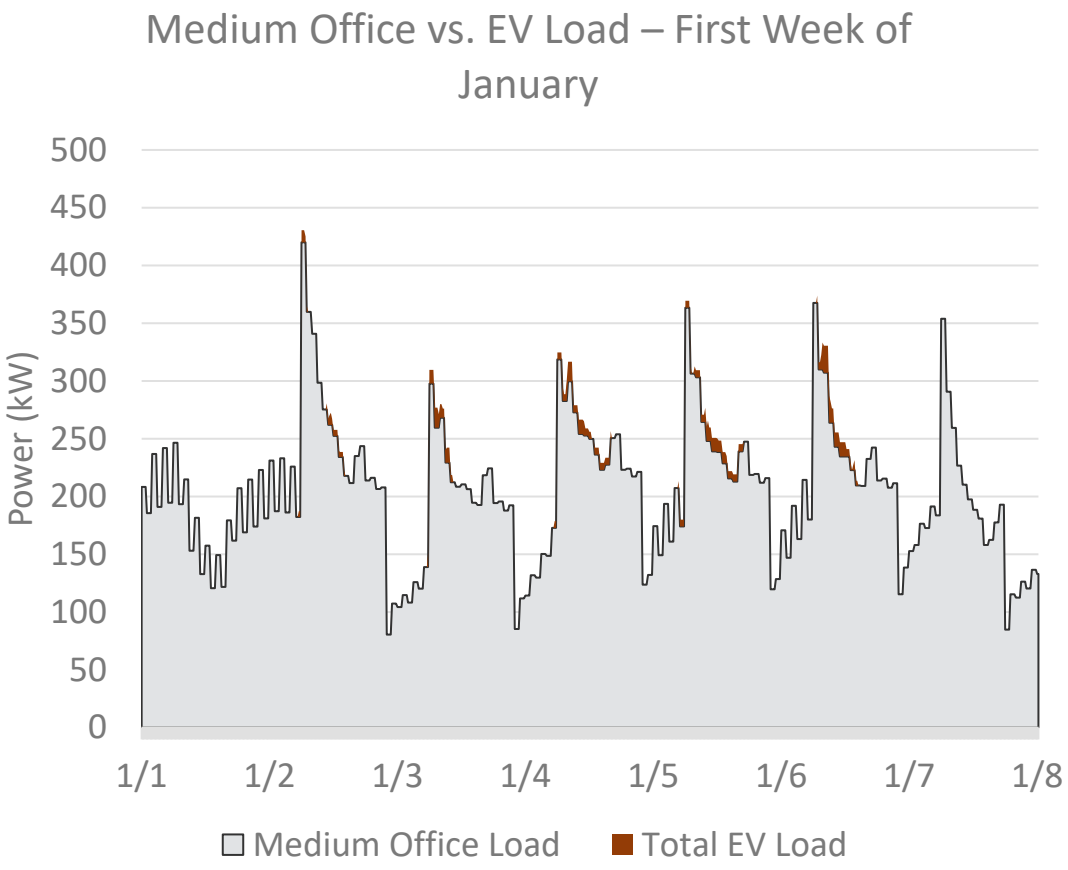
Example of optimal dispatch of PV and BESS

EVI-Pro EV Load Input for Static Load Profile

For the static load it was assumed that the EVs would start charging at the arrival time, and continue charging (6.6 kW) at the maximum rated power of the charge until the energy requirement was met



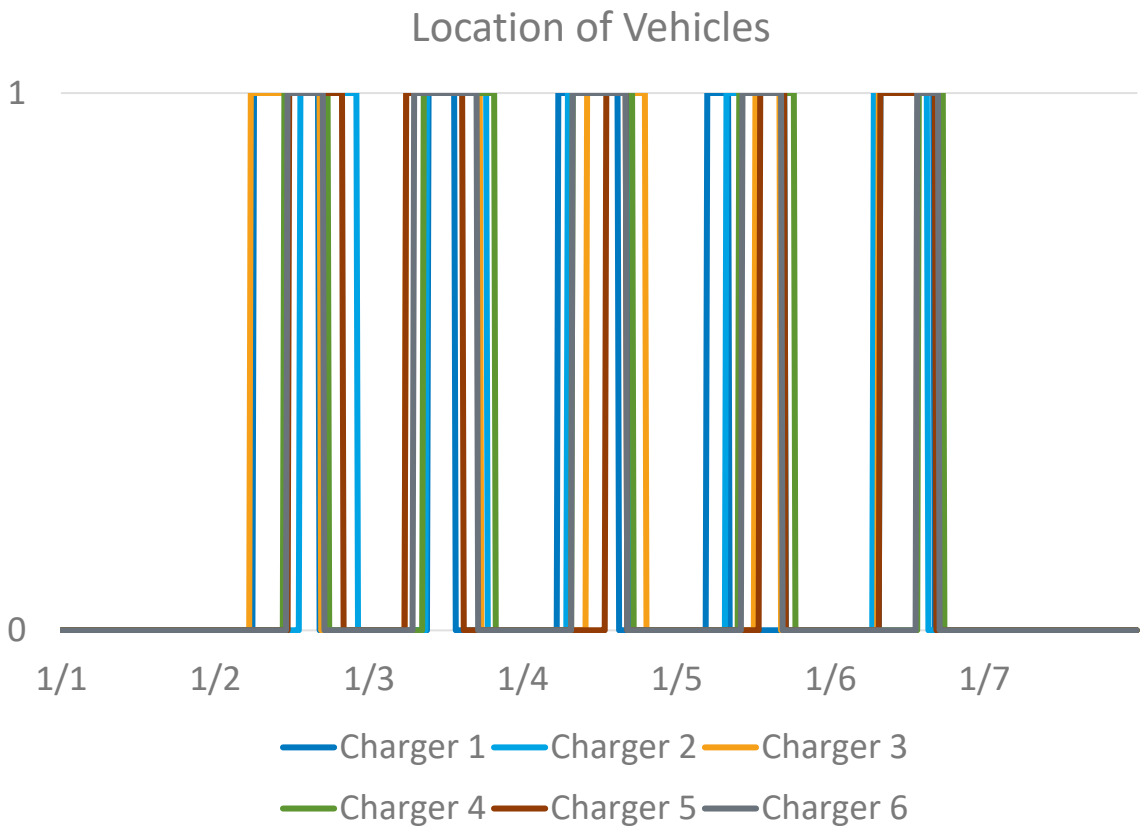
This chart shows the loads of the six chargers (each represented as its own color) over the course of a week in January. This evaluation of workplace charging assumed that charging only occurred on weekdays.



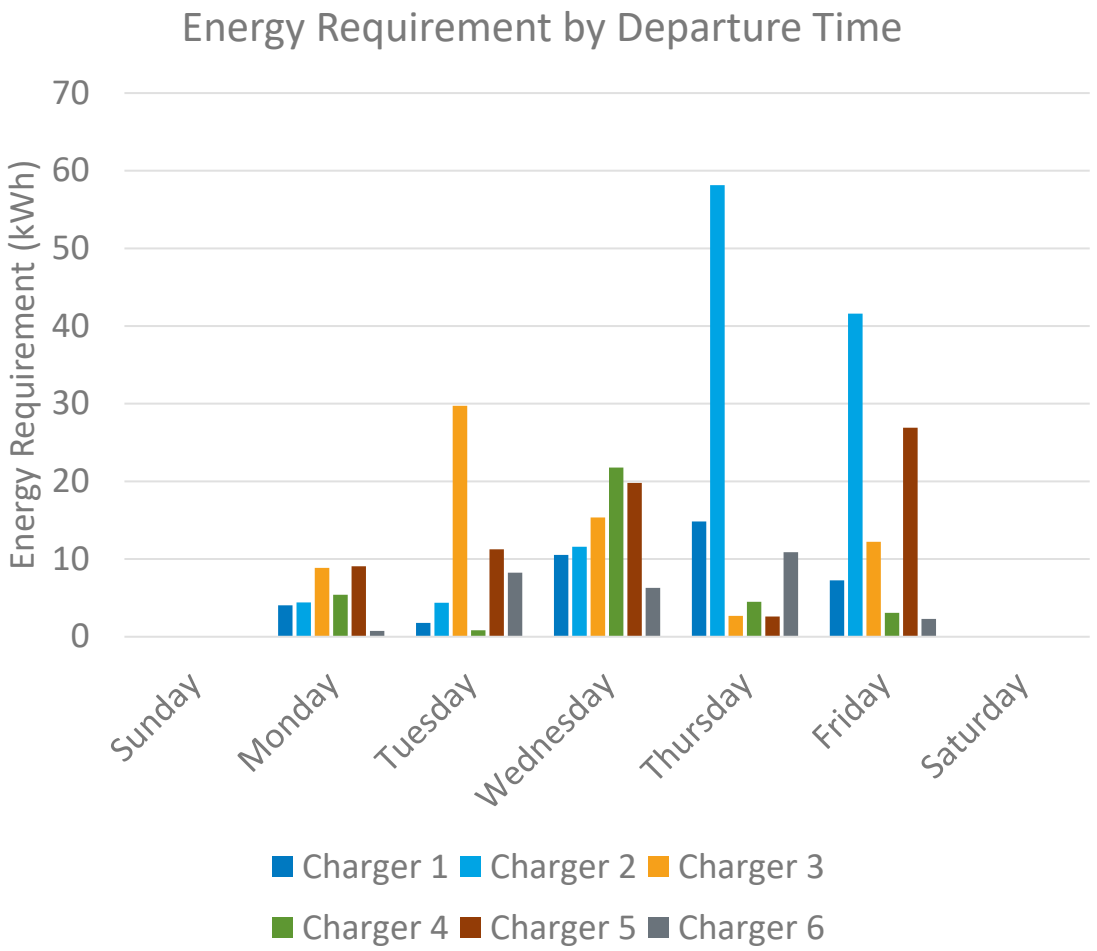
These charts show the static EV charging load (red) layered on top of the medium office load (in grey) for a week in January

EVI-Pro Load Input for Flexible Load Profile

For the flexible (or smart/managed) charging loads, the daily arrival and departure time, and energy requirement were entered into REopt; the model determined at what level the EVs were charged (between 0 and 6.6 kW) throughout the day, such that the energy requirement was met by the departure time and lifecycle costs were minimized



Location of EV
1 – At workplace charger
0 – Not at workplace charger



REopt Analysis for EV Workplace Charging in MN

For more information:

https://www.nrel.gov/docs/fy20osti/75269.pdf

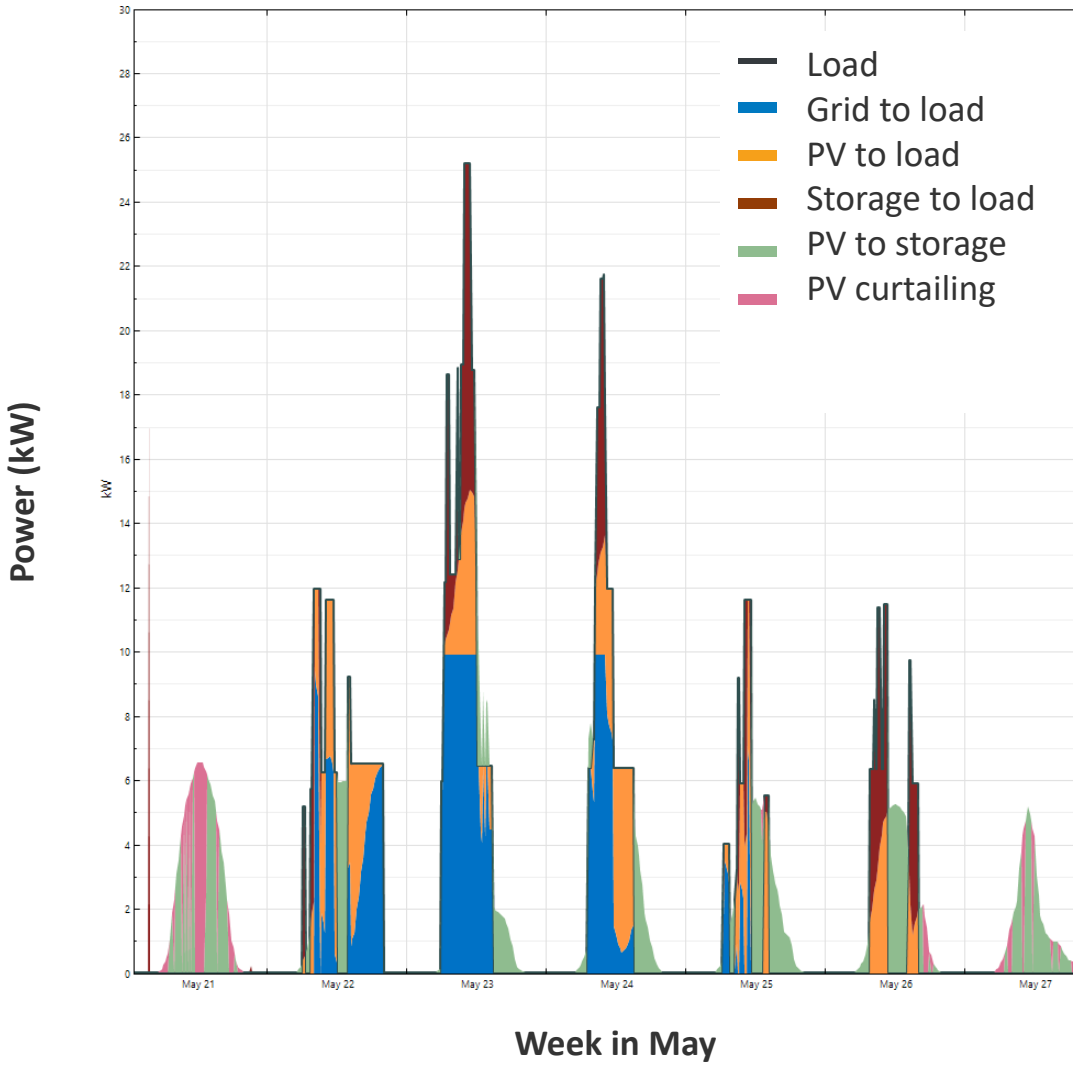
Impact of EV Workplace Charging in Minneapolis, MN

- In this analysis, NREL used the REopt model to evaluate the economics of workplace EV charging in Minneapolis, MN
- Utilized NREL's EVI-Pro database to generate static and flexible EV load profiles
- Evaluates the savings from adding PV and storage to EV charging infrastructure and/or flexibility in EV charging times

https://www.nrel.gov/docs/fy20osti/75269.pdf

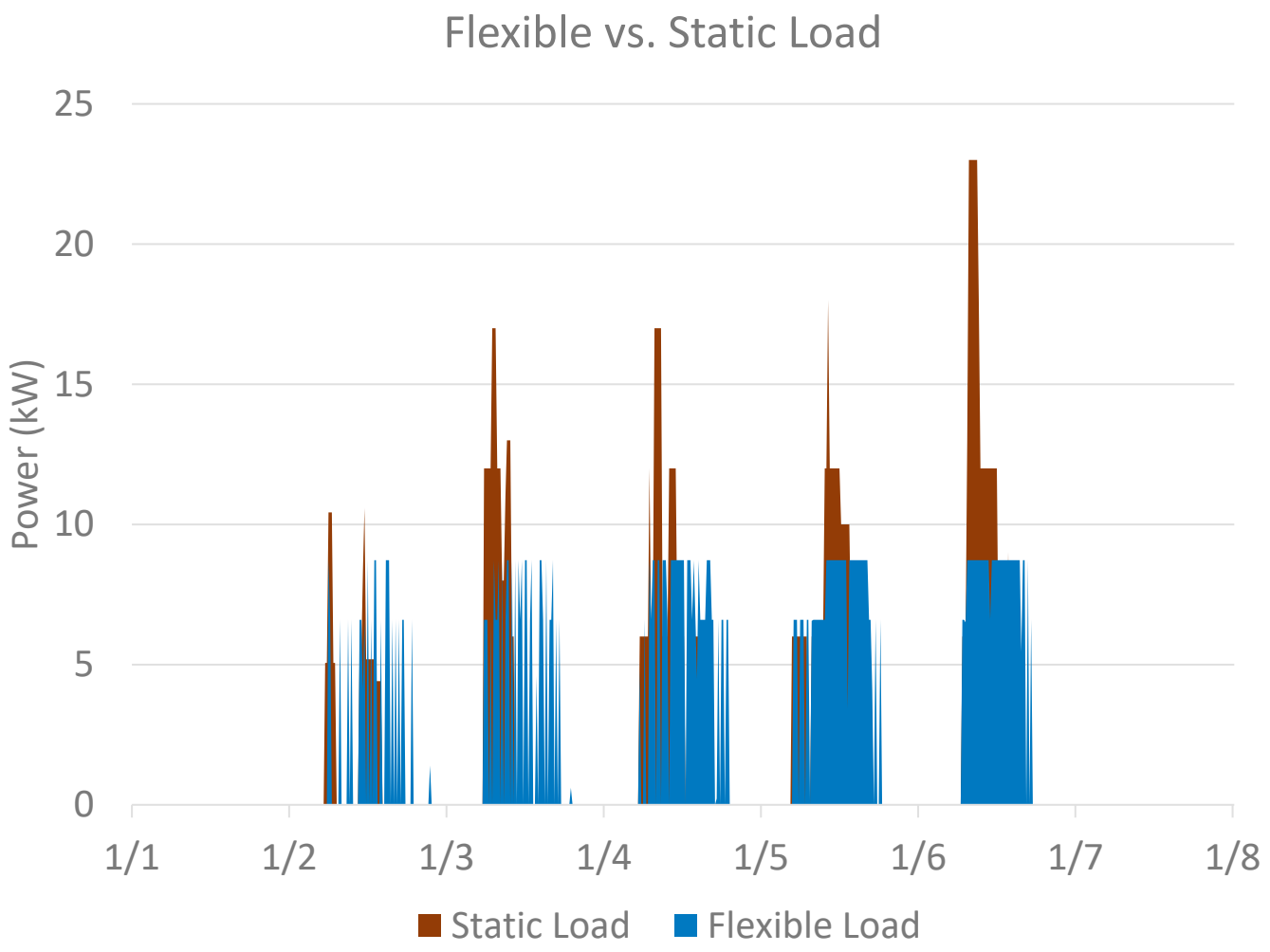
Savings from PV + Stationary Storage

Scenario	EV Chargers Only	EV Chargers + PV and Storage
PV Size (kW)	0	9
Battery Size (kW)	0	17
Battery Size (kWh)	0	28
Total Capital Cost ($)	$0	$49,100
Electricity Purchases (kWh)	17,400	9,100
Percent RE (%)	0%	64%
Year 1 Energy Costs ($)	$1,100	$600
Year 1 Demand Costs ($)	$4,500	$2,000
Year 1 Fixed Costs ($)	$300	$300
Year 1 Total Electricity Cost ($)	$5,900	$2,800
25 Year Lifecycle Cost ($)	$140,000	$118,000
Net Present Value (NPV) ($)	**$0**	**$21,000**



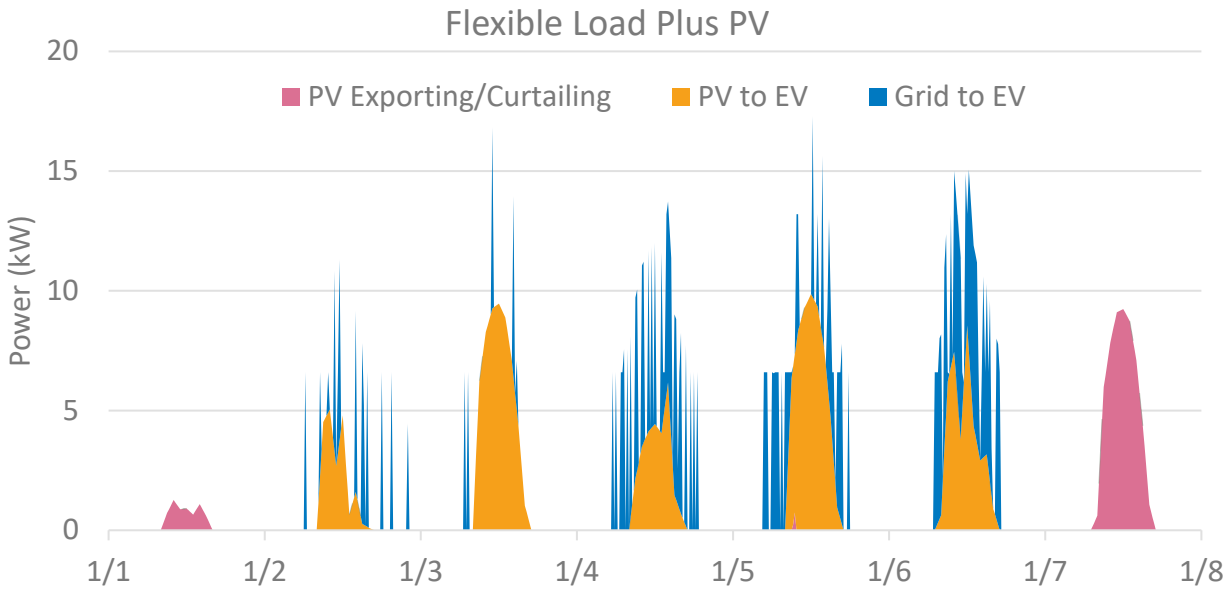
Results show that under NM Xcel A14, PV and battery storage can be used to mitigate the cost of the electric load from charging the EVs by offsetting both energy and demand costs.

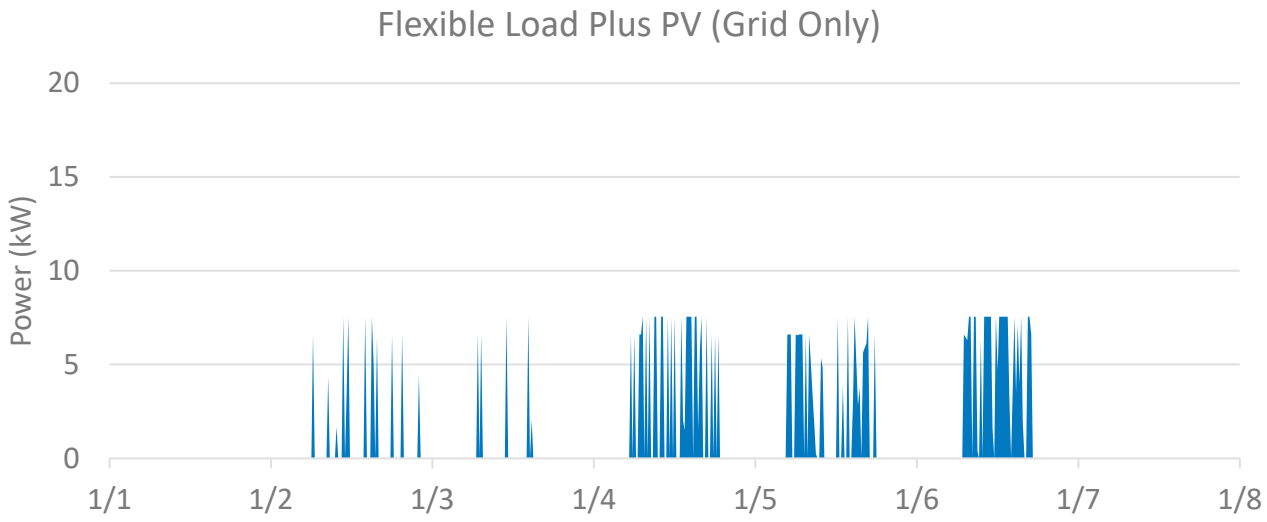
Savings from Flexible EV Charging



- When the model is allowed to determine how the EVs should be charged (flexible EV load), the load is spread out throughout the day, lowering the peak demand
- As a result, the demand charges are lowered from $4,500 to $1,400 in year 1 (energy and fixed charges are not impacted)
- Adding PV and/or storage (at current costs) to the flexible EV load only (no building load) does not appear cost effective, as the “peakiness” of the load has been mitigated, and a larger (longer duration), more expensive, battery would need to be installed for further reduce the demand and cost

Savings from Flexible Load and PV + Stationary Storage





- When battery storage and PV capital costs are reduced by 50%, a 13 kW PV system appears cost effective, lowering both energy and demand charges
- In this scenario, the PV system is serving the EV load during the day, and the EV load is being shifted to fit under the PV generation
- In this scenario, battery storage does not appear cost effective; the EV load flexibility is serving the same purpose as stationary storage, as the charging can be modified to mitigate demand charges

DC Fast Charging Station Design

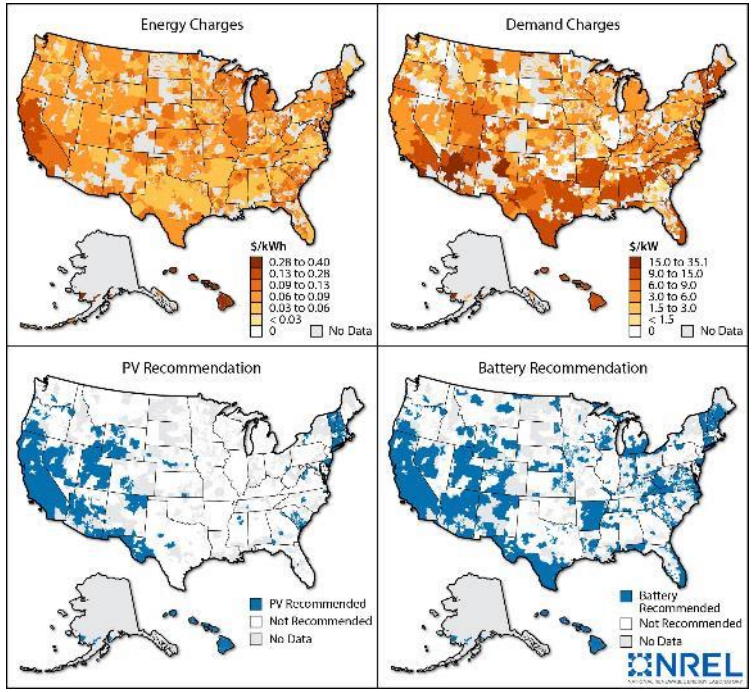
Description: NREL explored solutions that can help make DC fast charging (DCFC) more affordable for EV drivers in the United States:

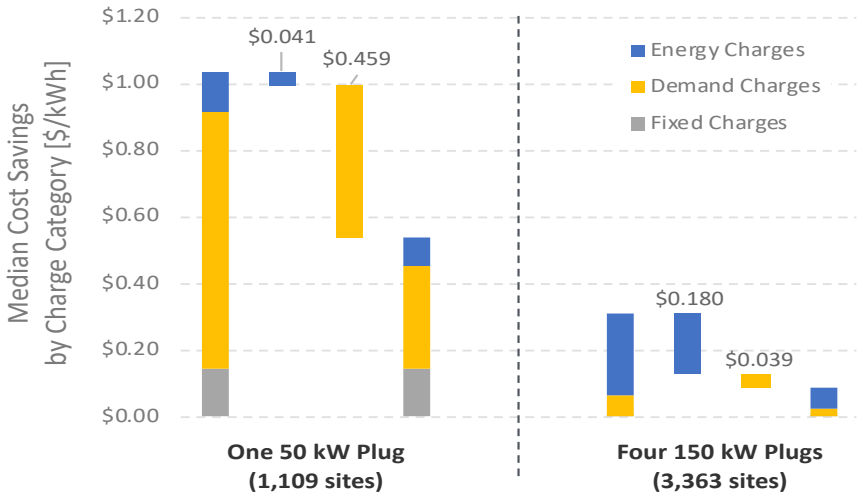
- Solar PV and/or energy storage (batteries)
- Co-locating DCFC with a commercial building

Technologies: DCFC, solar, battery storage

Impact: Found 11%–40% of sites can reduce lifetime electricity cost by installing technologies. Co-location often economically preferable but relative savings diminish as load increases.

Partners: DOE Vehicle Technologies Office





Matteo Muratori et al. *Technology solutions to mitigate electricity cost for electric vehicle DC fast charging.* United Kingdom: Applied Energy, May 2019. https://doi.org/10.1016/j.apenergy.2019.03.061.

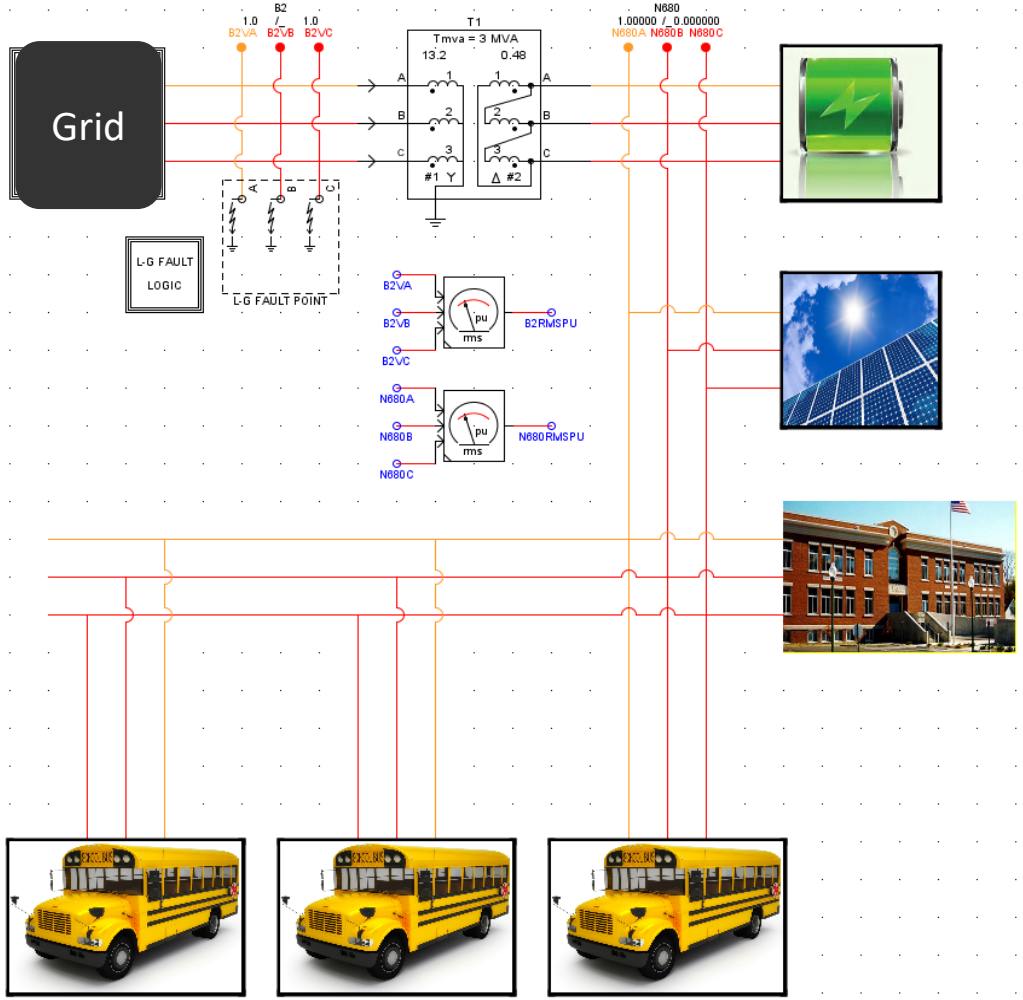
Integrating EV Fleets With DER and Grid

Description: NREL evaluated opportunities for synergistic integration and control of electrified transportation fleets with flexible buildings loads, RE, and stationary storage.

Technologies: Mobility, storage, buildings, solar, advanced system integration controls

Impact: Demonstrated optimal control of integrated RE, building loads, storage, and EV system in laboratory testing. Integrated system provided increased value to the site owner.

Partners: Eaton (funding partner), Holy Cross Energy, SDG&E, Duke Energy, UPS, EPRI



William Becker et al. *Cost Reduction of School Bus Fleet Electrification With Optimized Charging and Distributed Energy Resources*. Wichita, KS: North American Power Symposium. October 13–15, 2019. https://www.nrel.gov/docs/fy20osti/74187.pdf.

Thank you!

Emma Elgqvist

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REopt Renewable Energy Integration and Optimization

www.nrel.gov

reopt.nrel.gov

This work was authored by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308. Funding provided by the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Federal Energy Management Program. The views expressed in the article do not necessarily represent the views of the DOE or the U.S. Government. The U.S. Government retains and the publisher, by accepting the article for publication, acknowledges that the U.S. Government retains a nonexclusive, paid-up, irrevocable, worldwide license to publish or reproduce the published form of this work, or allow others to do so, for U.S. Government purposes.

NREL NATIONAL RENEWABLE ENERGY LABORATORY

Drew Torbin

Black Bear Energy

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empowering your portfolio ™

Better Buildings Summit
Commercial Real Estate: Sector Meet-Up
06.08.2020

A BUYER'S REPRESENTATIVE FOR RENEWABLE ENERGY

AGNOSTIC / ALIGNED / ACCOMPLISHED

- **We represent you**
  We are not tied to a manufacturer, financing facility, construction group, utility or any other supplier.

- **We align our interests with yours**
  We build our fees into the cost of a project and therefore are paid only if a project is successfully closed.

- **We are driven & experienced**
  We are passionate about delivering renewable and clean-tech projects which create value and have a track record of doing just that for some of the largest real estate owners in the U.S.

- **We are data driven**
  Our project database and volume provide leverage when negotiating favorable pricing and contractual terms.

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ENERGY

info@blackbearenergy.com

KEY METRICS

65+ CLIENTS

4B+ SQFT

10+ PROPERTY TYPES

3 FOCAL TECHNOLOGIES

1.5 RFP / WEEK

1 SITE RFP'd / DAY

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info@blackbearenergy.com

FEATURED CLIENTS

amc

KILROY REALTY CORPORATION

USAA REAL ESTATE

LBA

GATEWAY INDUSTRIAL PROPERTIES

LaSalle INVESTMENT MANAGEMENT

CLARION PARTNERS

CINEMARK

GID

Invesco

STAG INDUSTRIAL

Equity Residential

KIMCO REALTY

Rexford Industrial

AEW

IRON MOUNTAIN

LINK INDUSTRIAL

BentallGreenOak

SITE

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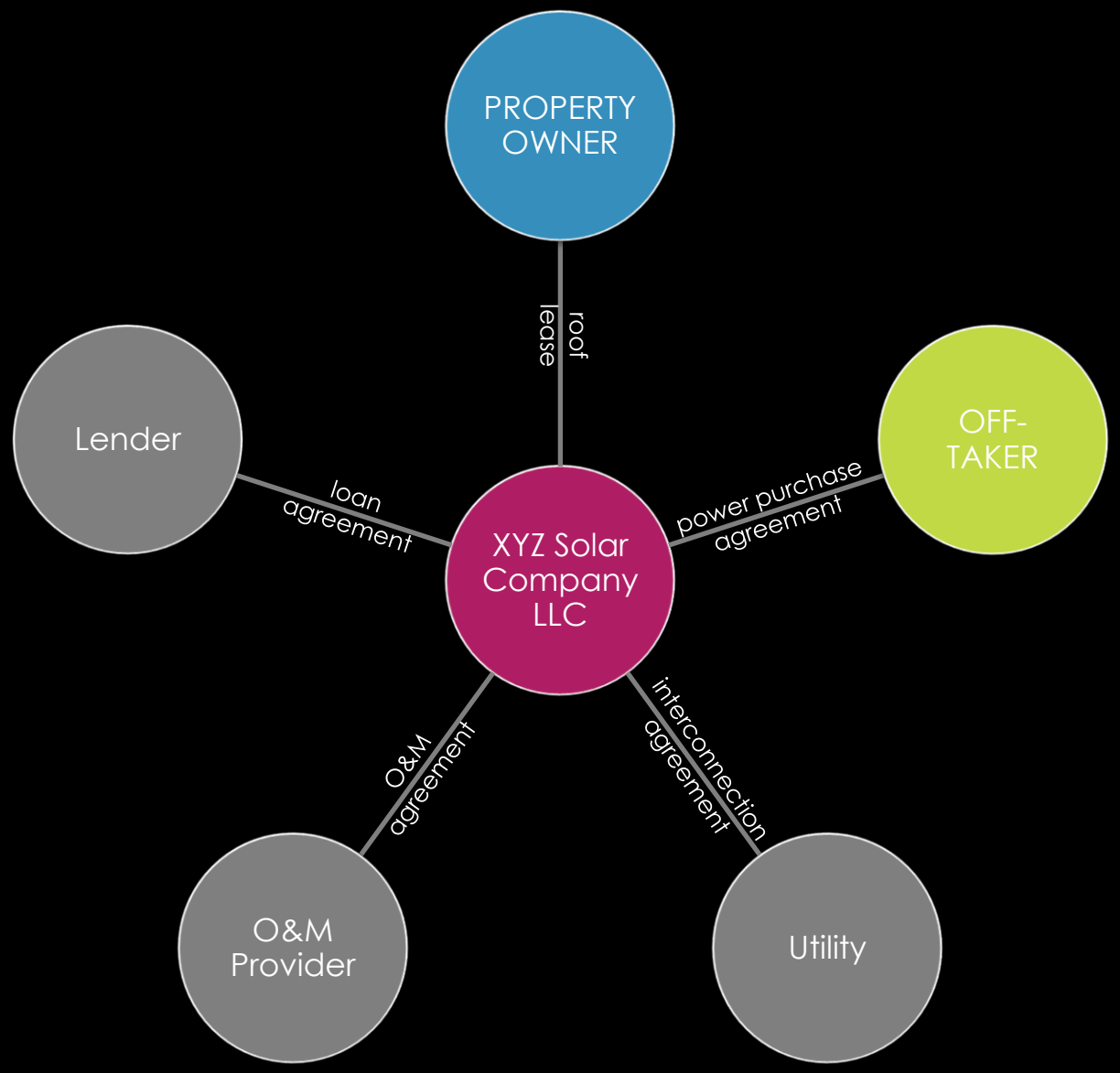
PROJECT STRUCTURE



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Poll #5

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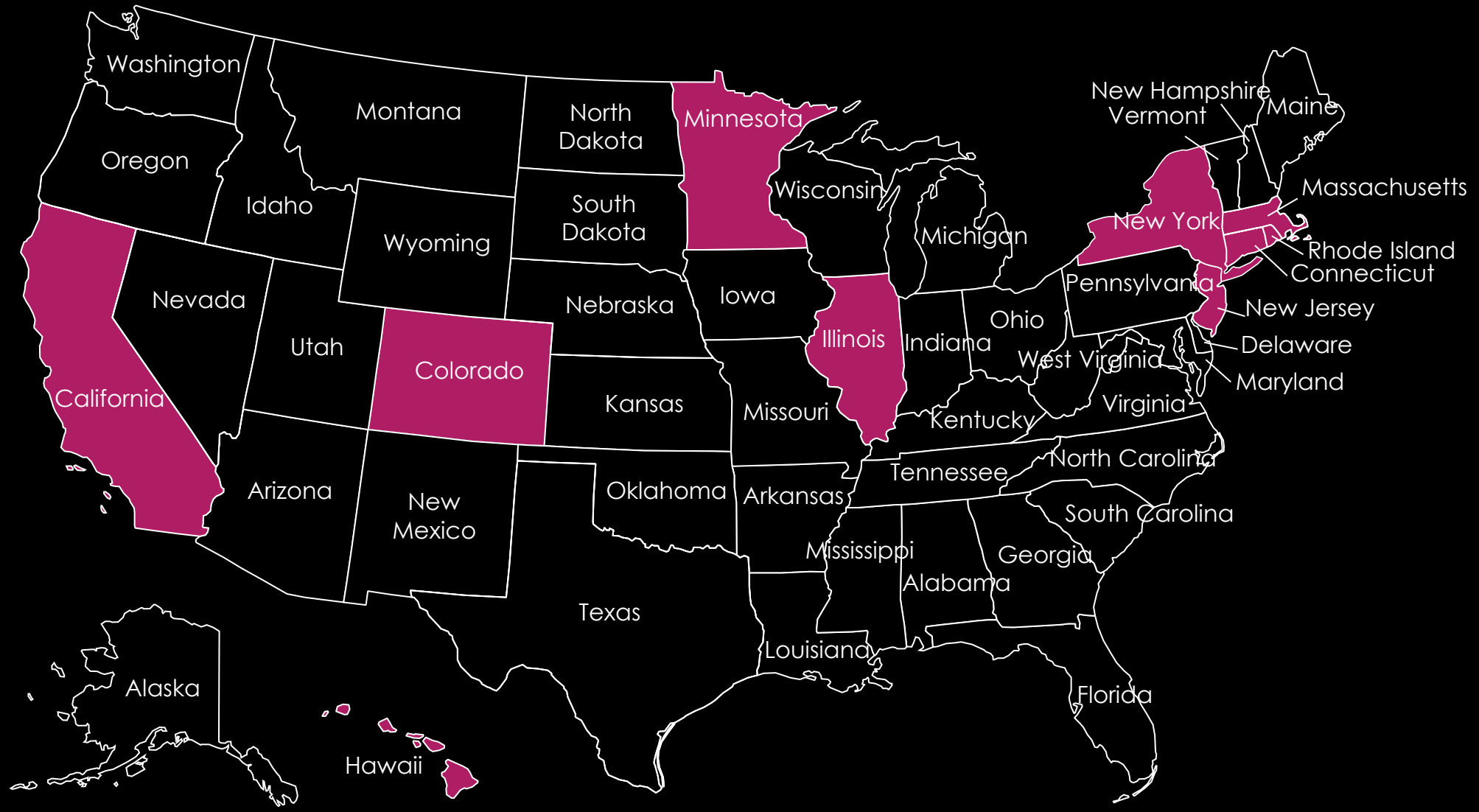
TOP 10 C&I SOLAR MARKETS



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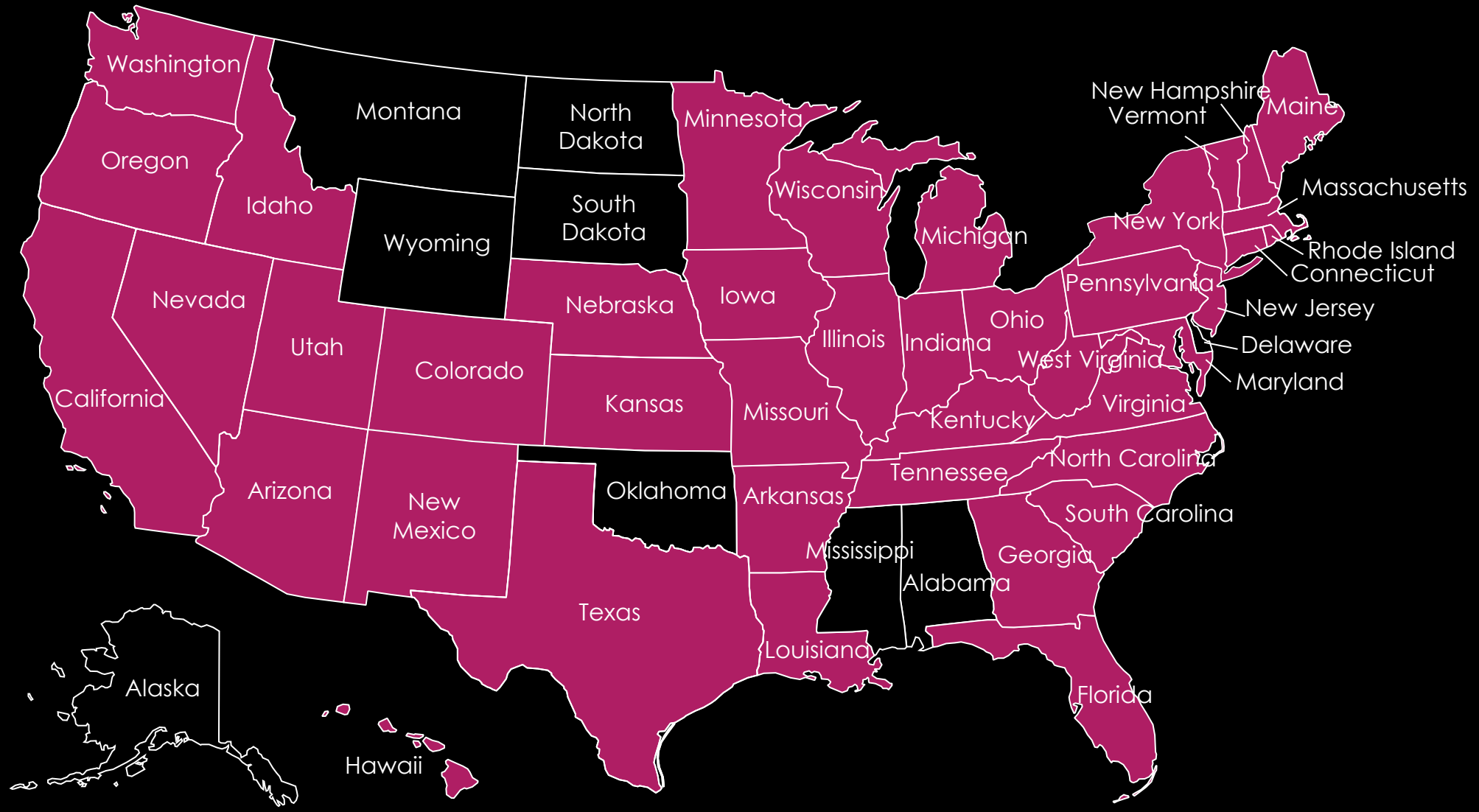
ALL ACTIVE C&I SOLAR MARKETS



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TOP BLACK BEAR C&I SOLAR MARKETS

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SOLAR MARKET ECONOMICS

Market	Primary Deal Structure	Program Status	Annual Rent Estimate ($/sqft/year)	Annual Rent Estimate ($/mw/year)	Minimum SQFT	Carports Viable	Midterm Roof Replacement Viable	Notes
DC	Host / Onsite	Open	2.00 - 3.50	$266K - $465K	15,000	Yes	Yes	DC feeders same economics
MA: Eversource	Host / Onsite	Open	.45 - .75	$60K - $100K	20,000	Yes	Yes	Block 3/8 & Requires storage
NY: ConEdison	Host / Onsite	Open			20,000	Yes	Yes	Currently in Block 8 of 11
CA: Los Angeles	Host / Onsite	Open			25,000	Yes	Yes	26 MWs remaining in program
NY: Long Island	Host / Onsite	Open			40,000	Yes	Yes	Limited Capacity
NJ	Host / Onsite	Open			40,000	Yes	Yes	TREC Transition Soon
MD	Host / Onsite	Open			100,000	No	No	Limited Capacity
CA: San Diego	Onsite	Open			50,000	Yes	Yes	Potential Future Host Market
CA: NorCal	Onsite	Open			50,000	Yes	Yes	
CA: SoCal	Onsite	Open			50,000	Yes	Yes	
MN	Host	Open			100,000	No	No	
PA	Host	Pending			100,000	No	No	Program to Open Soon
VA	Host	Pending			100,000	No	No	Program to Open Soon
IL	Host	Pending			100,000	No	No	Program to Open Soon

Data as of 06.01.2020

BLACK BEAR ENERGY

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Speaker Q & A

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Additional Resources

- Commercial Real Estate Sector page - Link
- Standard Energy Efficiency Data (Seed) Platform - Link
- The Tower Companies Installs Rooftop Solar - Link
- Electric Vehicles 2019 Better Buildings Webinar - Link
- Foundations of Efficiency Programs - Link
- Shorenstein Properties: Improved Waste Diversion With Training & Audits – Link
- IMT: Optimizing Sustainability & Wellness: A Guide for Managing Office Buildings During COVID-19 – Link
- IMT: Tenant Engagement Recommendations for Low-Occupancy Buildings – Link

Other Sessions Featuring CRE Partners

- Early Best Practices from the Waste Reduction Pilot (Shorenstein)
  - Thursday June 11th
  - 11 AM – 12:30 PM
- The Secrets of Better Buildings Goal Achievers (Lendlease)
  - Thursday June 11th
  - 1 PM – 2:30 PM
- Closing Plenary – A Path Forward: Perspectives on Efficiency and Operations (The Tower Companies)
  - Thursday June 11th
  - 3 PM – 4:30 PM

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

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

July 9

STRATEGIES TO COMBINE ENERGY + HEALTH UPGRADES IN MULTIFAMILY HOUSING

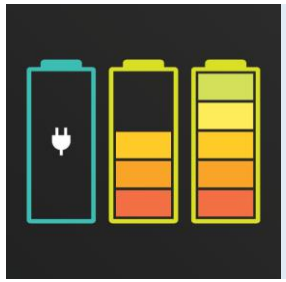
July 21

SUCCEED WITH SUBMETERING:
HOW TO MAKE THE BUSINESS CASE

August 4

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 NOW

Additional Questions?

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