



2019 Annual Meeting of the Membership

Wednesday, June 19, 2019
Kansas City, MO



Welcome & Meeting Overview

Jim Jerozal, MEEA Chair
Nicor Gas

Today's Agenda

8:45 – 9:00am	Welcome & Meeting Overview
9:00 – 9:20am	Keynote: Mayor Sly James
9:20 – 10:00am	Member Introductions
10:00 – 10:15am	Board Elections
10:15 – 10:45am	Networking Break
10:45 – 11:30am	MEEA Report to the Membership
11:30am – 12:45pm	Lunch
12:45 – 1:00pm	State Policy Update
1:00 – 2:15pm	Plenary: Getting to Know GEBs
2:15 – 2:20pm	Closing
2:30pm	Buses depart
3:00pm – 4:30pm	Tour of Kauffman Stadium

The Honorable Sly James Mayor of Kansas City

Keynote Speaker

Thank you to KCP&L for
sponsoring the opening
reception!

Introductions

Governance Report

Scott Steiner, Governance Chair
Lockheed Martin

Governance Report

Exiting Board Members

Our thanks to the following board members and their organizations for their years of service!

- Alliant Energy: **Bonnie Donnolly** (Anne Carter)
- CLEAResult: **Shaun Dentice** (Lauren Casentini)
- Edison Foundation Institute for Electric Innovation: **Adam Cooper**

Governance Report

Governance Committee

Thanks to the committee for their work to not only choose the next board, but managing the governing rules and policies of MEEA

- Scott Steiner, Lockheed Martin
- Brian File, Kansas City Power & Light
- John Nicol, Leidos
- Sam Mueller, Nexant
- Jeff Erickson, Navigant
- John Boladian, DTE Energy
- Anthony Fryer, MN Dept. of Commerce

Governance Report

Board Election Process Overview

1. Determine open positions on the board

Sector representation:

- 36-40% Utilities
- 36-40% EE Businesses
- 12% Academic/Research
- 12% Government

2. Call for candidates
3. Review and score applicants
4. Review scores and develop slate of candidates
5. Board review
6. Send out proposed slate to members
7. Member elections

Governance Report

Board Election Process

The Governance Committee considers the candidate's background and experience

- Organization's support and involvement with MEEA
- Organization's and candidate's energy industry exposure and connections within the industry
- Candidate's energy efficiency experience
- Candidate's level and breadth of responsibility for energy efficiency within their organization
- Candidate's activity and experience with MEEA

Governance Report

Board Election Process

- Internal reviews: staff, Governance & Executive Committees, full Board vote
- 10 candidates applied this year from 4 member sectors
- 4 seats were available:
 - 1 Utilities
 - 1 EE-Businesses
 - 1 State or Local Government
 - 1 Research, Academic and Advocacy
- Electronic voting was open June 7-18, 2019

Governance Report

Election Results: Incumbents

- **Ameren Illinois:** Kristol Whatley Simms
- **ICF International:** Michaela Martin
- **KC P&L:** Brian File
- **Lockheed Martin:** Scott Steiner,
- **Michigan Department of Environment, Great Lakes, and Energy:** Dr. Brandy Brown
- **Navigant:** Jeff Erickson
- **Slipstream*** (formerly Wisconsin Energy Conservation Corporation): Mary Woolsey Schlaefer

Governance Report

Election Results: New Members

- Academic, Research and Advocacy
 - **Citizens Utility Board:** Kristin Munsch
- EE Related Business
 - **Franklin Energy:** Paige Knutsen
- Government
 - **Public Service Commission of Wisconsin:** Jolene Sheil
- Utilities
 - **AEP Ohio:** Gary Enama

Governance Report

Meet the New Board Members

Gary Enama

AEP Ohio (since 1980)

Energy Efficiency Program Manager

Manages all aspects of AEP Ohio's prescriptive, custom, self-direct, and advanced lighting programs



Education

- Engineering degrees in HVAC Design & General Studies, Kent State University
- Bachelors in Business Management, Malone University
- Certified Energy Manager (CEM), certified energy auditor (CEA) and residential certified auditor (REA)

Governance Report

Meet the New Board Members

Paige Knutsen

Franklin Energy Services
Senior Vice President - Regional Operations



Provides program design, implementation and continuous improvement support for the company's operations

Builds & maintains relationships with utility clients and assists in the start-up and implementation of grid optimization programs across the U.S. and Canada.

Education

- Master's degree in sustainable agriculture, Iowa State University
- Certified energy manager (CEM) and LEED AP certified

Started her energy efficiency career at MEEA



Governance Report

Meet the New Board Members

Jolene A. Sheil

Public Service Commission of Wisconsin
Portfolio Manager



Oversaw transition of Focus on Energy from
Dept. of Administration to the Public Service
Commission in 2007

Previously managed the Focus on Energy Business programs
and pilot

Education

- B.A. in Public and Environmental Administration and Political Science from the University of Wisconsin-Green Bay
- Master's in Political Science with an emphasis on energy and environmental policy, University of California-Riverside and the University of Wisconsin-Madison

Governance Report

Meet the New Board Members

Kristin Munsch

Illinois Citizens Utility Board
Deputy Director



Focuses on regulatory policy, rate design, utility data access and challenges in designing a “utility of the future”

Current member of the Illinois Smart Grid Advisory Council, Energy Foundry Board of Directors, and Board President for the Consumer Advocates of PJM States

Previous Assistant Attorney General for State of Illinois, Public Utilities Bureau

Education

- Graduate of Northwestern University and the Chicago-Kent College of Law

Governance Report

Board Election Process

Our thanks to all applicants
& members for participating
in the election process!

Governance Report

FY20 MEEA Officers

- **Chair** - Shawn White, Xcel Energy
- **Vice Chair** – Mary Schlaefer, Slipstream
- **Secretary** – Nate Baer, Staples Energy
- **Treasurer** – Jim Jerozal, Nicor Gas

Networking Break

MEEA Update

Stacey Paradis, Executive Director
MEEA



MEEA Board

- MEEA Board of Directors
- Thank you!
- The support and guidance is essential for MEEA to ensure that we achieve our mission and serve our members

MEEA Staff

- MEEA staff
- True professionals committed to our mission and driven to increase the energy savings through energy efficiency
- We are all here to work with you
- Our job as a membership organization is to serve our members as well as our mission

MEEA Update



2018 ANNUAL REPORT

The Trusted Source on Energy Efficiency

What MEEA did
in 2018

- Research
- Connections
- Advocacy
- Training
- Certification
- Outreach



RESEARCH
CONNECTIONS
ADVOCACY

TRAINING
CERTIFICATION
OUTREACH



Strategic Action Plan

FY2020-2025 Goals



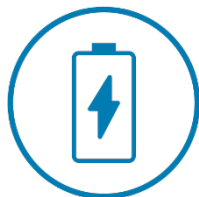
Promote the value and impact of energy efficiency (EE) among key stakeholders, including elected officials and regulators. Position EE as a resource and ensure that EE is defined as an essential pathway to achieving clean energy goals.



Ensure that MEEA members receive the maximum value for their membership investment.

Strategic Action Plan

FY2020-2025 Goals



Expand the organization's expertise in areas of the energy sector adjacent to energy efficiency.



Increase the level of energy efficiency understanding and opportunity across the region through training and education, research, collaboratives, market transformation, direct outreach and other future identified efforts.

Strategic Action Plan

FY2020-2025 Goals



Develop, support and promote innovative and impactful policies and actions to strengthen the EE industry by prioritizing equity, inclusion, access and diversity.



Ensure that MEEA's organizational structure, staff development and engagement of the Board of Directors is conducive to stable, healthy organization.

Program Report

E'Lois Thomas, Program Committee Co-Chair
SEEL, LLC

Program Committee Report

FY19 Program Snapshot

	TRAINING & EDUCATION	COLLABORATIVES	MARKET TRANSFORMATION
ACTIVE	<ul style="list-style-type: none">• Building Operator Certification (BOC)• Illinois Home Performance• Illinois Science and Energy Innovation Foundation work• Appraisal Education	<ul style="list-style-type: none">• Intelligent Efficiency• Midwest LUMEN• Midwest Home Performance• Utility R&D	<ul style="list-style-type: none">• Midwest Market Transformation collaborative• Building America• Municipal Streetlighting• TRM Project• National Lab Work• Home Buyer Access• K-12 Outreach

Program Committee Report

Training & Education



Program Committee Report

Collaboratives: Midwest LUMEN

- **Members:** Utility lighting program managers
- Provides common ground for discussions around current programs, future technologies and program design, challenges and successes
- In-person meetings held twice a year
- Webinar meeting held during summer
 - Will be held in July focusing on online applications for utility programs

Program Committee Report

Collaboratives: Utility R&D

- **Members:** Utility staff in emerging tech or research & development
- Platform to share R&D pilots and initiatives being pursued in their service territories.
- Utilities can share research, reports and lessons learned through these initiatives
- Meetings held quarterly (in-person and via conference line)

Program Committee Report

Market Transformation

- Midwest Market Transformation Collaborative
 - Utility forum to develop market transformation practices, methods and initiatives to allow multi-year energy savings
 - Facilitates a pooling of resources to implement MT initiatives regionally and nationally
 - Administered by MEEA and Resource Innovations

Program Committee Report

Homebuyer Access

- Researching national best practices to engage the real estate sector on energy efficiency
 - Working with Elevate Energy, funding from ComEd
- Developing a 3-hour training geared towards real estate agents in ComEd territory
- Piloting an energy scorecard specific to the City of Chicago
- Conducting outreach to real estate professionals to educate them on the energy eCompliance tool

Program Committee Report

FY19 Programs

K-12 Outreach

- MEEA provides education and application assistance to K-12 schools located in ComEd service territory
- Key Metrics in FY19
 - Facility assessments requested: 38
 - Facility assessments completed: 151
 - Total Annual kWh Savings Achieved: 6,896,190
 - Outreach to 1,208 schools



Program Committee Report

FY19 Programs

Municipal Streetlight Assistance

- MEEA provides technical assistance to local communities to upgrade outdoor lighting
- Key Metrics in FY19
 - Provided assistance to
 - Le Roy, IL 500 streetlights
 - Urbana, IL 2900 streetlights
 - Lincoln, NE roughly 30,000 streetlights
 - Effingham, IL roughly 30 streetlights

Program Committee Report

Ways to Engage

- Join the Program Committee
 - Guide which topics we should be researching and presenting to our members
- Call for webinar topics – July 18th 3pm, CST
 - Email with info to follow; sign up for program committee to receive
- Join the Steering Committee to review topic ideas
 - Contact Bill Angelos at wangelos@mwalliance.org

Membership Report

Sam Mueller, Membership Committee Chair
Nexant

Membership Report

Overview

- 167 members
- Benefits:
 - Connection to MEEA network: committees, working groups, collaboratives
 - Invitation to member-only events: Annual Meeting, Member Receptions
 - Access to MEEA resources, including member directory, policy briefings
 - Promotion of member news and events in MEEA Minute, Twitter and LinkedIn
 - Ability to present on MEEA webinars
 - Discounts on MEEA programs and events

Membership Report

Welcome, New Members!

- Argonne National Laboratory
- American Efficient
- Applied Energy Group
- Blue Line Innovations
- Bradford White Corporation
- Celia Johnson Consulting
- Chicago Bungalow Association
- Daikin North America LLC
- Ecotagious
- Energy Management Solutions
- EnergyX Solutions Inc.
- Erthe Energy Solutions
- EZ Green Home
- Illume Advising
- JadeTrack
- Lennox Industries
- MaxLite
- Milepost Consulting
- The National Energy Improvement Fund (NEIF)
- NMR Group, Inc.
- OpenEE
- PACENation
- Pearl Certification
- Slipstream
- Tendril, Inc.
- Village of Oak Park
- Walker-Miller Energy Services
- WPPI Energy

Membership Report

2019 Midwest Energy Solutions Conference

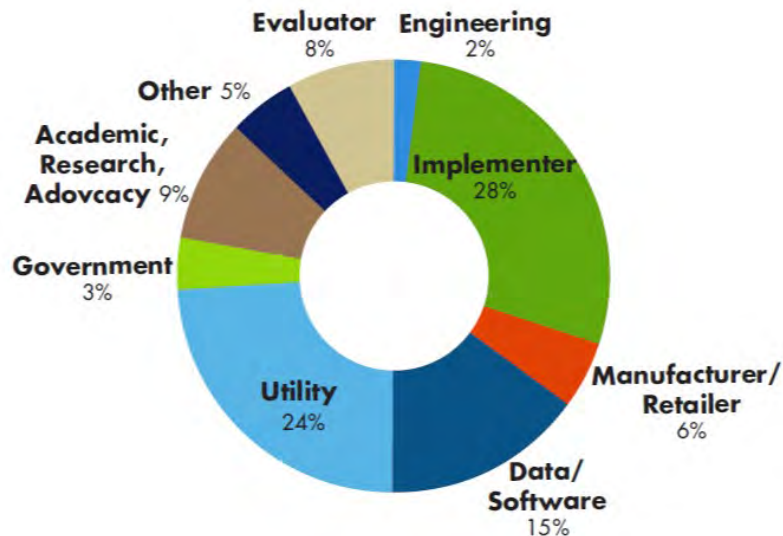
Highlights

- Largest MES conference
- Highest rated MES
- New workshops on diversity, intelligent efficiency and energy equity

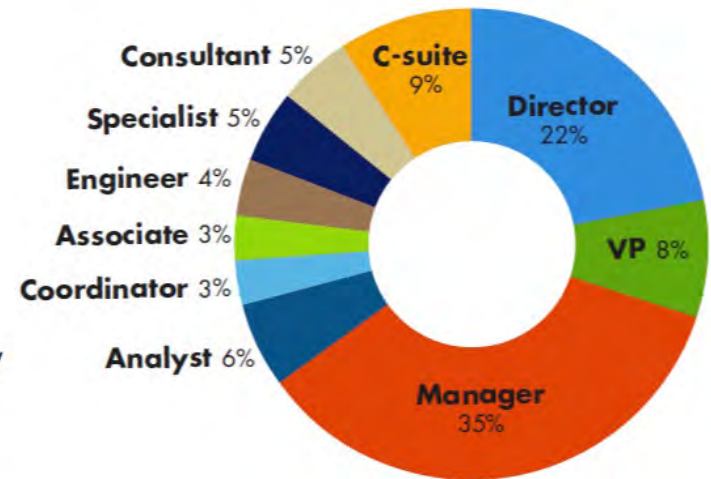
Featured Speakers & Topics

- Dr. Tony Reames, University of Michigan
- Impact of Nov 2018 Elections
- Market Transformation
- Beneficial Electrification

Attendees by Sector



Attendees by Title



Membership Report

2019 Inspiring Efficiency Award Winners

Chairman's Award

- Lauren Casentini

Innovation

- Focus on Energy, Wisconsin SEM Leaders Initiative

Leadership

- Mayor Rahm Emanuel, City of Chicago
- Richard Mark, Ameren Illinois

Education

- Ameren Illinois Program Allies

Impact

- Minnesota Army National Guard

Marketing

- Focus on Energy, "Wisconsin is In" Campaign

SAVE THE DATE

2020 MIDWEST **ENERGY** SOLUTIONS CONFERENCE

FEBRUARY 26-28, 2020
CHICAGO, IL

2020 MES Conference

Sponsorship Opportunities

- Sponsorship Prospectus in folders
 - MEEA members receive 20% discount
 - Open to members first
- Sign up early to get first choice on booth space
 - Get your logo on conference lanyards, keep everyone caffeinated by sponsoring coffee or choose your own adventure with sponsorships
 - All add-ons are first come, first served

2020 MES Conference

Call for Topics & Agenda Development

- MEEA members only
- Submit topics and ideas for keynote speakers, plenary discussions and break-out sessions
- How to Submit
 - **Online:** Visit meeaconference.org
- Due by August 9, 2019



Honoring the
Midwest's best &
brightest in
energy efficiency

Categories

- Education
- Impact
- Innovation
- Leadership
- Marketing
- Chairman's

Call for nominations now open

Apply by Sept. 13 at meeaconference.org/awards

Awards Dinner & Gala

Thursday, February 27, 2020 (during MES 2020)
Chicago Marriott Downtown



SAVE THE DATE



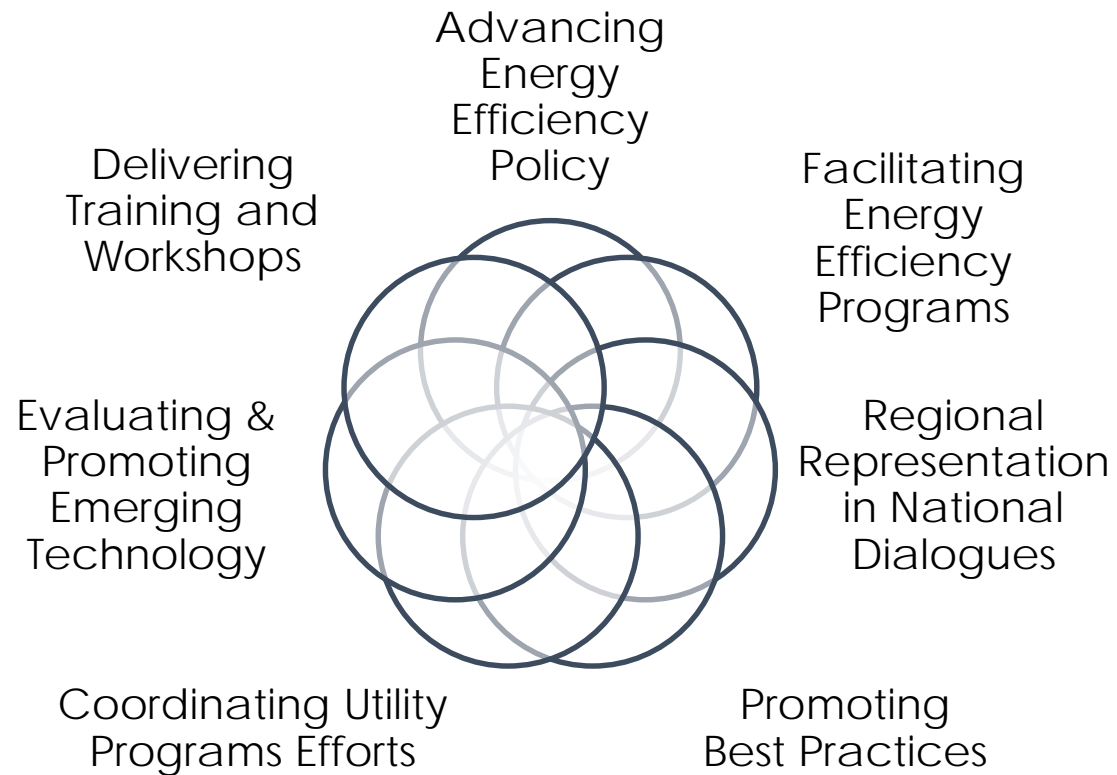
NOVEMBER
13-14
Omaha, NE

2019 **Midwest
Building Energy Codes
Conference**

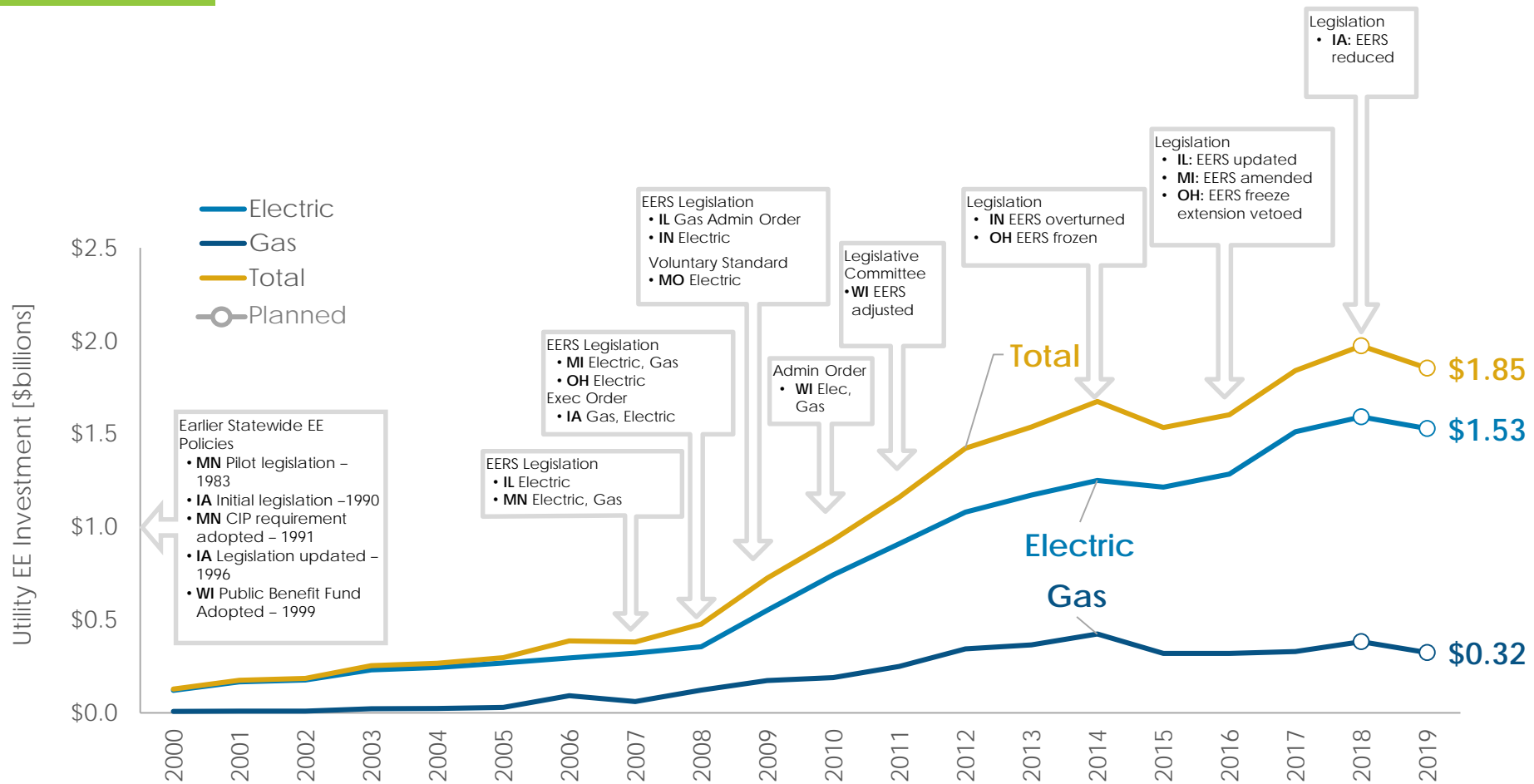
Policy Report

John Nicol, Policy Committee Chair
Leidos

Policy Report

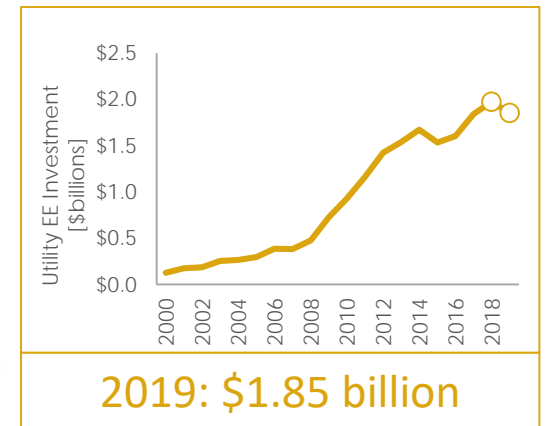
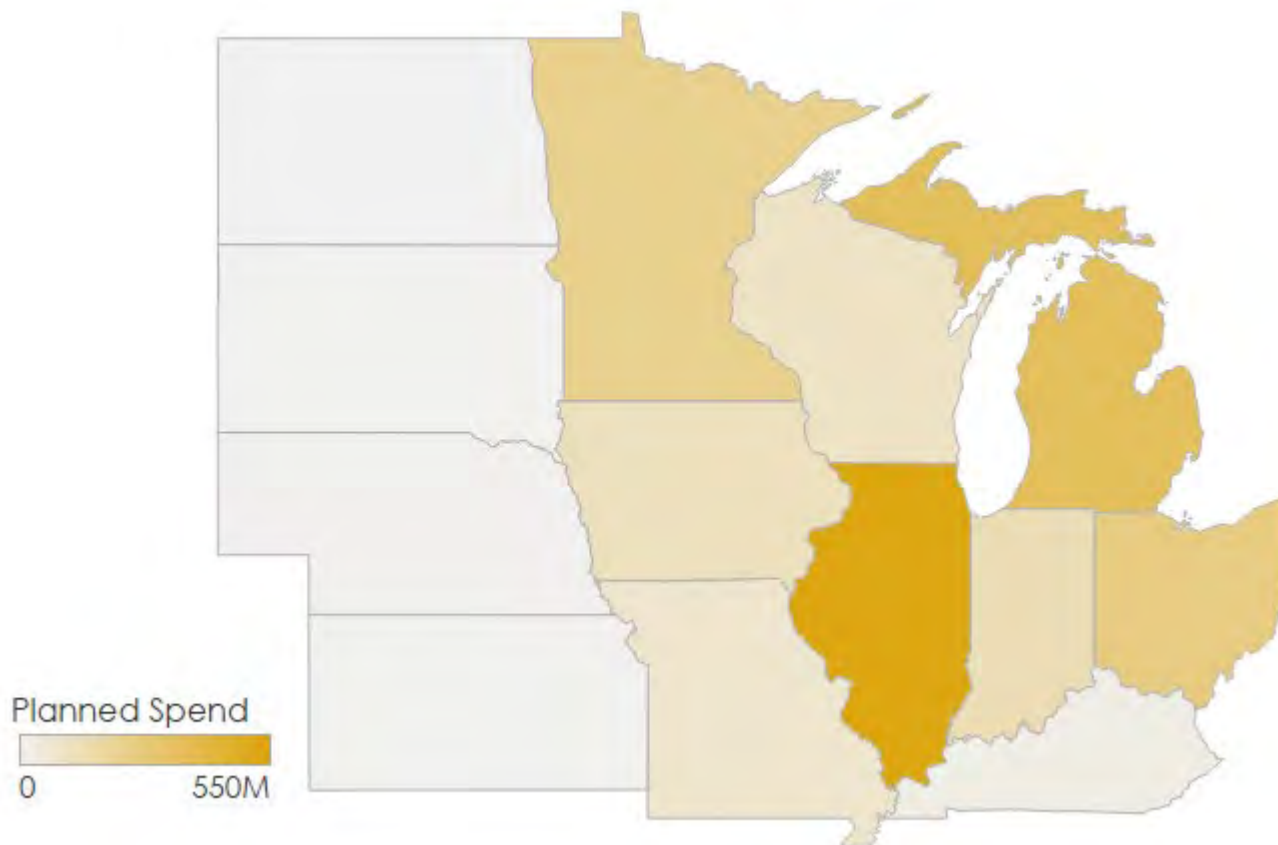


Annual Utility Investment in EE in the Midwest



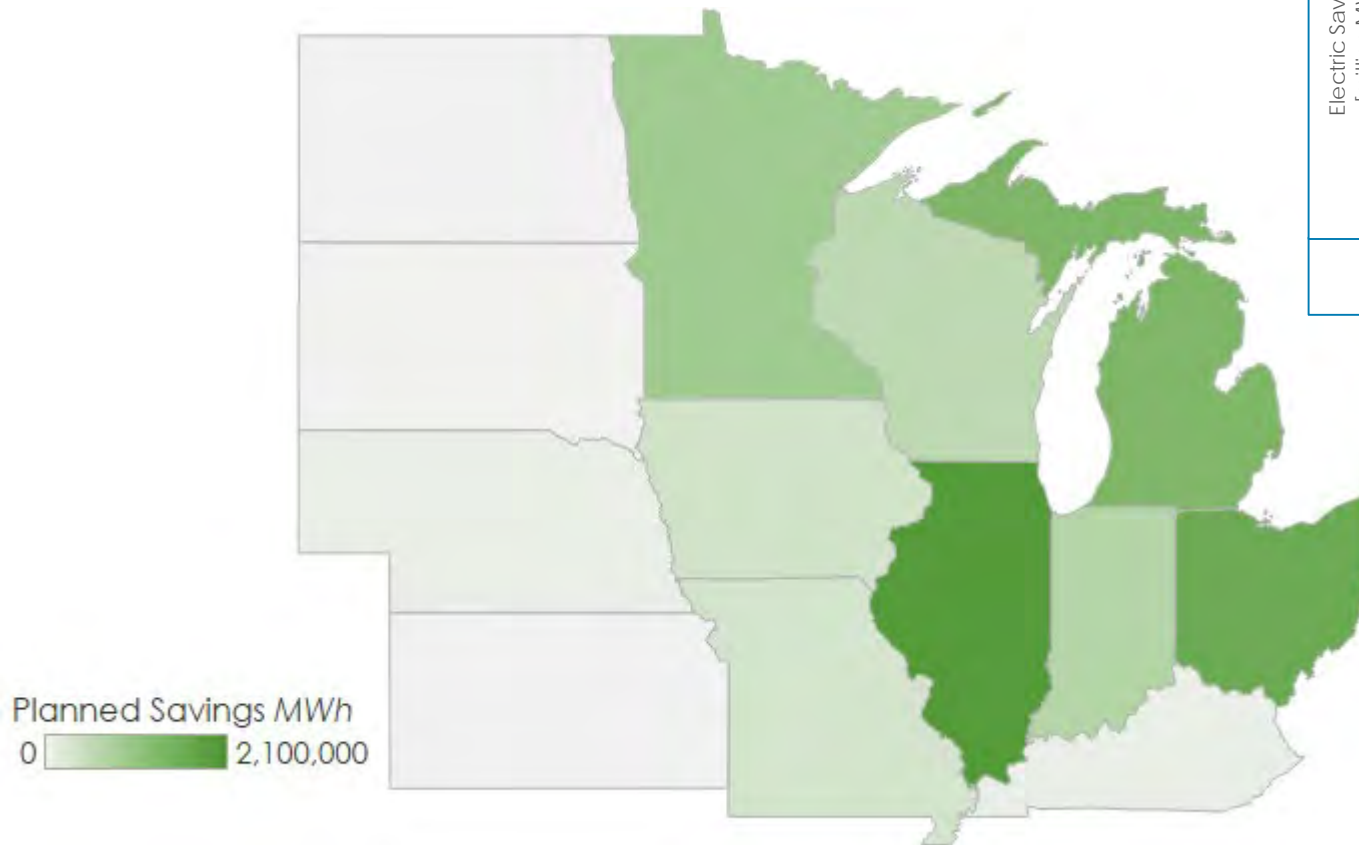
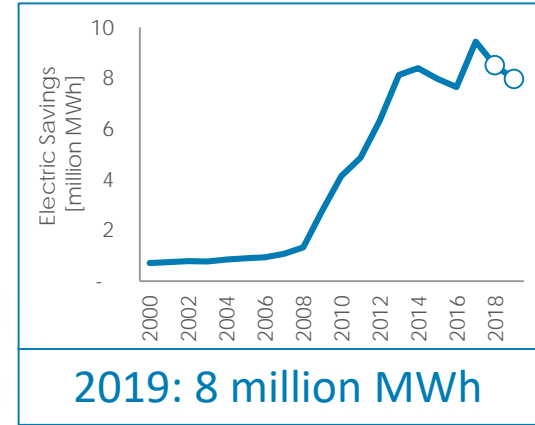
Energy Efficiency Investment in the Midwest

*Statewide **Total** Energy Efficiency Budget*



2019 Midwest Efficiency Savings

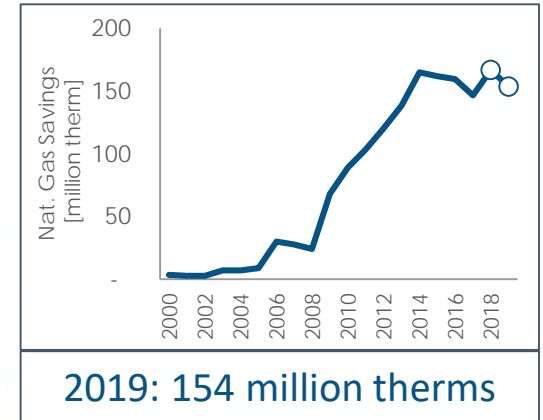
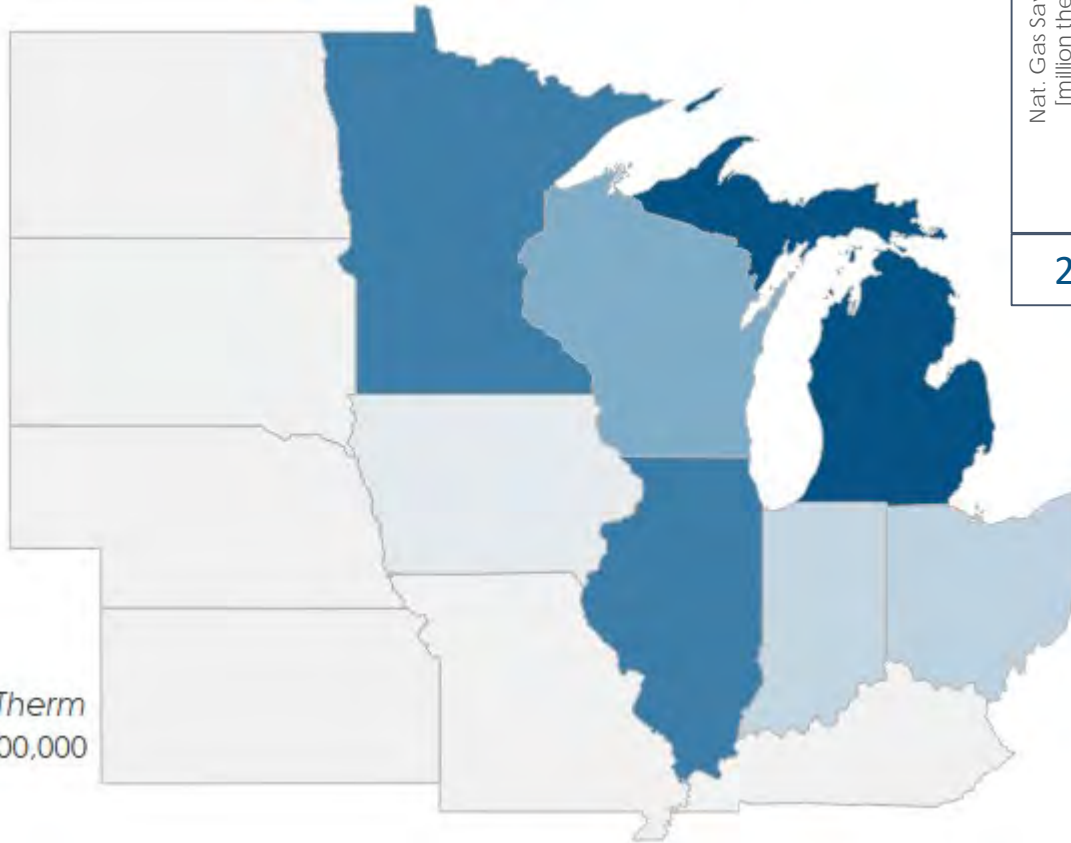
Electric



2019 Midwest Efficiency Savings

Natural Gas

Planned Savings Therm
0 50,000,000



Policy Report

Legislative and Regulatory Successes

- Ohio
 - Last year HB 114 successfully stopped. The bill would have weakened the EERS and hurt EE investment.
 - PowerForward: Ohio's grid modernization report released August 2018.
 - Working groups continue in 2019 on distribution system planning and data.
- Michigan
 - The PSC re-established the Low-Income Energy Waste Reduction Working Group.

Policy Report

Legislative Activity

- Illinois
 - Clean Energy Jobs Act (CEJA) a comprehensive clean energy and environmental bill:
 - Expands gas utility energy efficiency requirements
 - Repealing the industrial exemption
 - Increasing spending on income-qualified programs
 - Potential action on the bill this fall.
- Iowa
 - SF 638 was signed into law: places hard spending caps for energy efficiency plans - 1.5% (gas) and 2% (electric) of annual retail rate revenue.

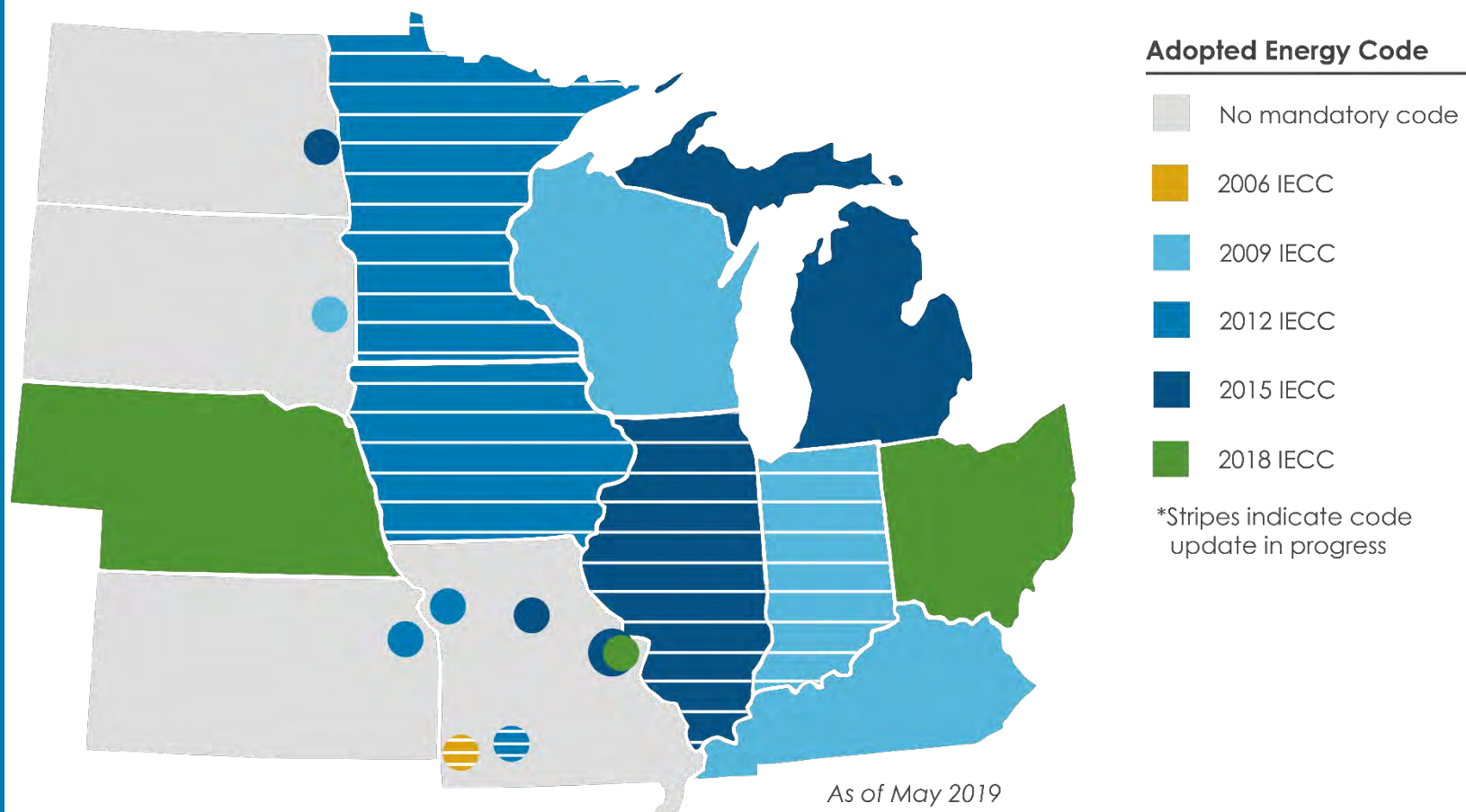
Policy Report

Legislative Activity

- Ohio
 - The House has passed HB 6, which eliminates the EERS after 2020 and creates new surcharges for nuclear and coal plants.
- Minnesota
 - The House passed the Clean Energy First Act as part of a larger jobs and energy package.
 - This would have implemented Governor Walz's plan for 100% carbon-free by 2050, and created a process that prioritizes EE and renewables before building new fossil fuel generation.
 - Senate and House could not agree so the provisions were removed from the omnibus bill.

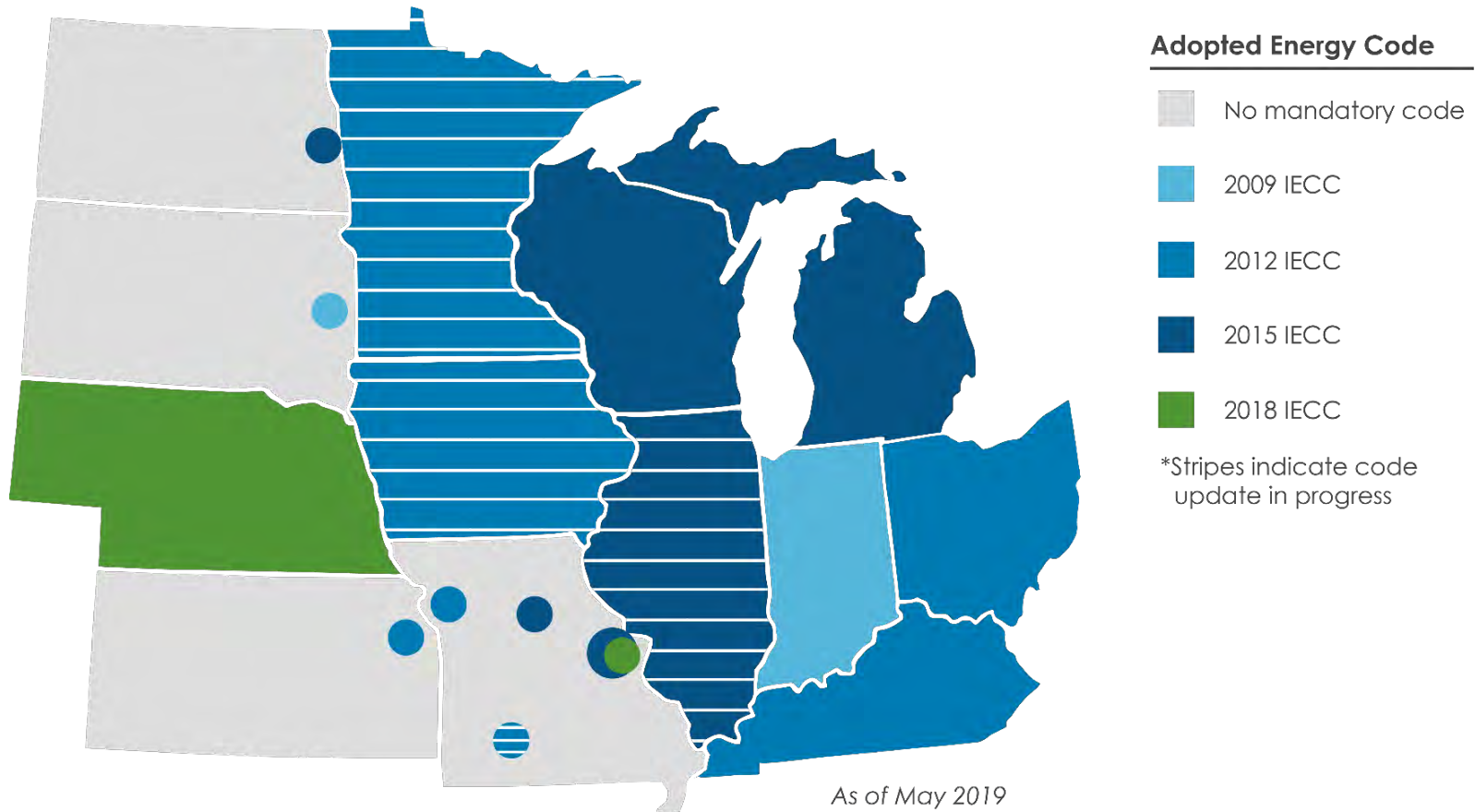
Residential Building Energy Codes

Current Status of Midwest States



Commercial Building Energy Codes

Current Status of Midwest States



Policy Report

Code Adoption

- Code Adoption Success FY 2019
 - Nebraska: 2009 – 2018 IECC
 - St. Louis, MO: 2009 – 2018 IECC*
 - Chicago, IL: 2015 – 2018 IECC*
 - Illinois: 2015 – 2018 IECC*
 - Ohio: 2009 -2018 IECC* (Residential)

* Includes Amendments

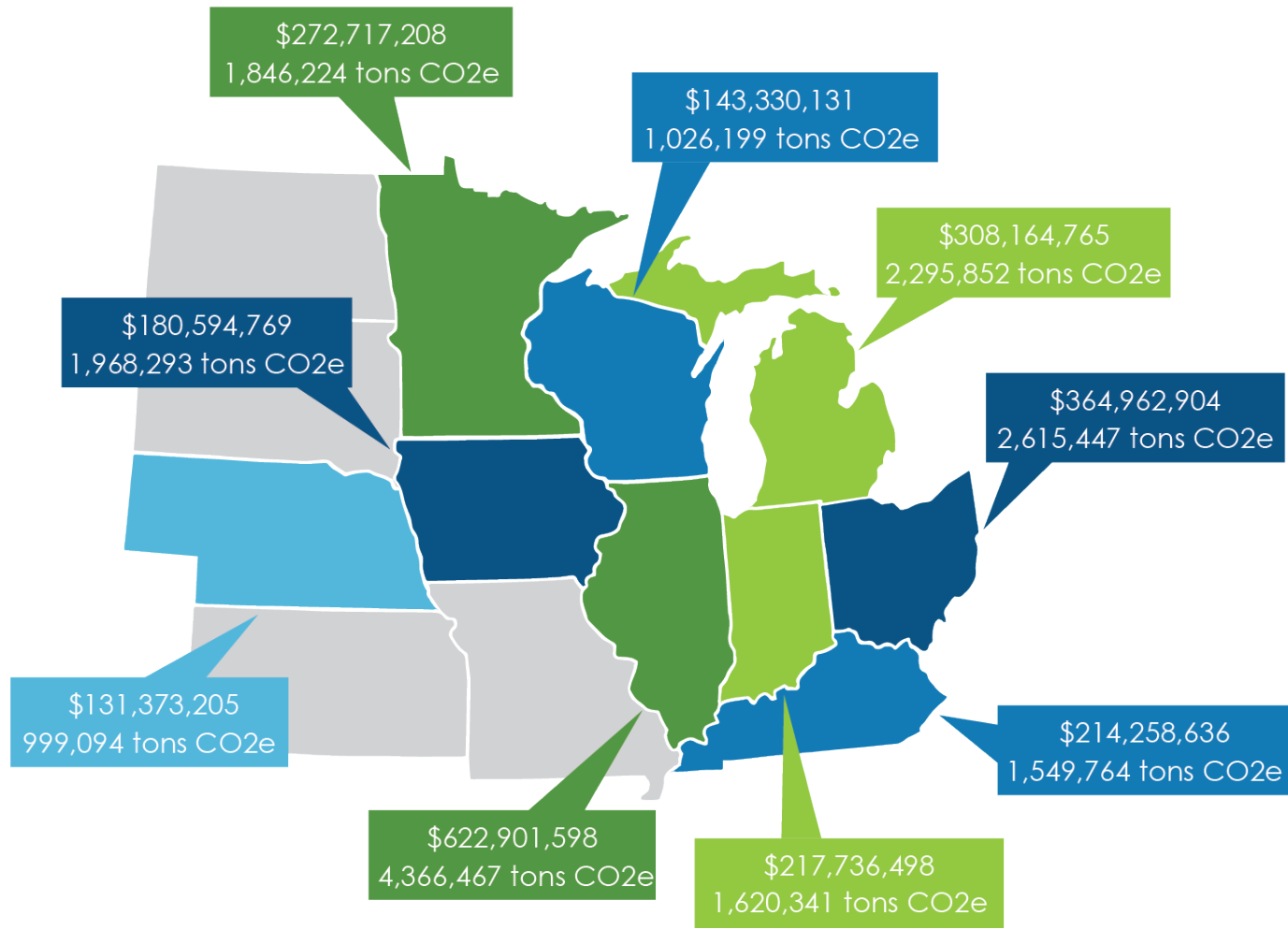
Policy Report

Code Compliance

- 5 Code Compliance Collaboratives
 - IL, MI, MN, MO, NE
- 3 Code Compliance Studies
 - IL, MN, NE
- 1 Energy Code Support Program
 - Ameren MO Code Support Program

Building Energy Code Impacts in the Midwest

Cumulative Savings 2009-2018



Local Benchmarking Legislation

Current Status of Midwest States



MEEA Policy Resources

<http://www.mwalliance.org/initiatives/policy>

- MEEA Policy Insider
- Midwest Building Efficiency Report
- Midwest Energy Efficiency Spotlight
<http://www.mwalliance.org/resources/spotlight>
- White papers, fact sheets, issue briefs, blogs
<http://www.mwalliance.org/resources/advocacy-toolkit>
- Policy issue webinars and state action calls
<http://www.mwalliance.org/resources/meea-publications>

Policy Committee

- Policy Committee
 - Policy webinars with issue specific focus
 - State briefings calls
 - All of MEEA's policy resources
 - Creating Policy Steering Committee to identify topics for research, webinar topics, additional advocacy activities and resources
- Board Policy Committee
 - Provide strategic guidance on the direction of MEEA's advocacy efforts

Finance Report

Mary Schlaefer, Finance Co-Chair
Slipstream

Finance Committee

- **Treasurer/Chair:** Shawn White, Xcel Energy
- **Co-Chair:** Mary Schlaefer, WECC
- Adam Cooper, Edison Foundation
- Scott Drake, East Kentucky Power Cooperative
- Shaun Dentice, CLEAResult
- Brandon Renaud, City of Columbia (MO)
- E'Lois Thomas, SEEL LLC.
- Stacey Paradis, MEEA
- **Staff contact:** Bill Angelos & Gillis Buckingham, MEEA

Finance Report

FY18 Audit Results

- In fiscal 2019, the FY18 (06/30/18) audit was completed with a clean result
- Total Assets-\$4,070,060
- Total Liabilities-\$770,251
- Total Net Assets-\$3,299,809
- Operating Reserve-Fully Funded at \$775,000
- Strategic Reserve -funded at \$921,881

Finance Report

FY19

- Under MEEA's conservative budgeting process, FY19 began last July with a deficit forecast.
- As of May 31st, MEEA is on track to come in ahead above of budget expectations for FY19.

Finance Report

FY19 at May 31, 2019

- Total Assets-
\$4,023,676
- Total Liabilities-
\$ 541,430
- Total Net Assets-
\$3,482,245
- Operating Reserve-Fully Funded at
\$775,000
- Strategic Reserve -Funded at \$912,289

Finance Report

MEEA Goals

- Sound Financial Position
- Diversified Funding Base
 - Programs: Federal, state & corporate funding
 - Policy: Foundation, federal & state grants
 - Membership: Dues
 - MES Conference
- Healthy Operating Reserve and Net Asset levels
- Effective Fiscal and Financial Strategies
- Active Finance Committee Oversight

Lunch

Sponsored by EZ Green Home

State Policy Update

Nick Dreher, Senior Policy Manager

Nick Hromalik, Policy Manager

Ian Blanding, Building Policy Manager

Policy Report

Successes & Opportunities

- Nebraska
 - Adopted strongest energy code in the Midwest
- Des Moines, IA
 - Passed Mandatory Benchmarking Ordinance
- Illinois
 - Clean Energy Jobs Act (CEJA) a comprehensive clean energy and environmental bill:
 - Expands gas utility energy efficiency requirements
 - Repealing the industrial exemption
 - Increasing spending on income-qualified programs
 - An energy package could pass this fall

Policy Report

Challenges & Calls to Action

- Iowa
 - SF 638 was signed into law: places hard spending caps for energy efficiency plans
 - 1.5% (gas) and 2% (electric) of annual retail rate revenue
- Ohio
 - The House has passed HB 6, which eliminates the EERS after 2020 and creates new surcharges for nuclear and coal plants
 - Senate action likely this summer

2019
**MIDWEST
ENERGY EFFICIENCY
SPOTLIGHT**



#MEEASpotlight



Getting to Know GEBs

Plenary discussion

Getting to Know GEBs

Plenary discussion

- Anthony Fryer, Minnesota
Department of Commerce
- Monica Neukomm, U.S. Department
of Energy
- David South, West Monroe Partners
- Dan York, ACEEE



MEEA Annual Meeting
June 19, 2019

Minnesota Perspective: Grid-interactive Efficient Buildings





Anthony Fryer

Minnesota Department of Commerce

1. Minnesota Background
2. State Energy Office
3. Minnesota PUC
4. Next Steps



GO TWINS!!!

Central Division			W-L	PCT	GB	WCGB	L10	STRK
1		Twins	47-23	.671	-	-	7-3	L1
2		Indians	37-33	.529	10	0.5	7-3	W3
3		White Sox	34-36	.486	13	3.5	5-5	L2
4		Tigers	25-43	.368	21	11.5	2-8	L4
5		Royals	23-48	.324	24.5	15	4-6	W1

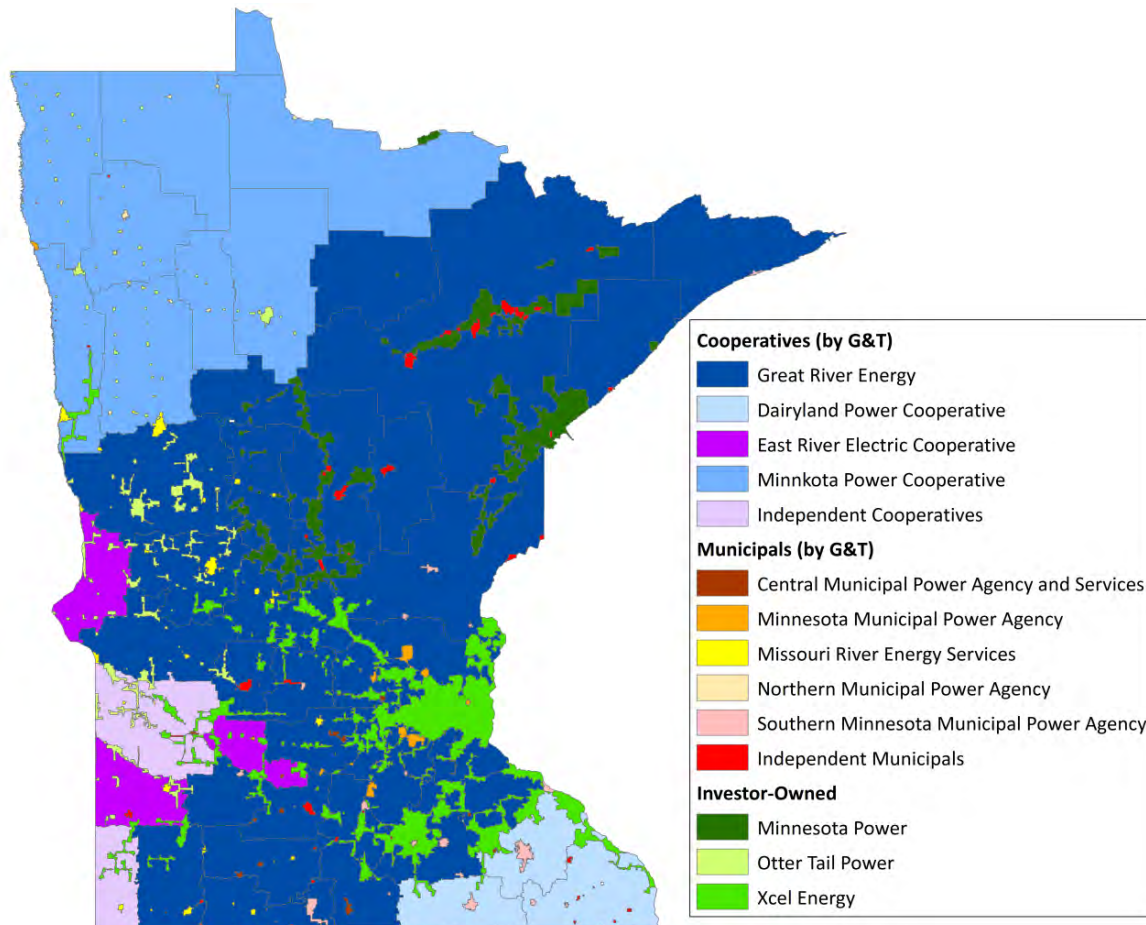


Minnesota Background

- Minnesota State GHG Reduction Goals
 - 30 percent below 2005 levels by 2025, at least 80 percent below 2005 levels by 2050, across all sectors
- Xcel Energy Carbon Reduction Goal
 - Reduce carbon emissions by 80% in the Upper Midwest by 2030, completely carbon free by 2050
- Regulatory Framework
 - State Energy Office – Purview over implementation of State's EERS. Separate unit represents public interest before the PUC
 - MN PUC – Regulates IOUs (and one coop) rate cases and IRPs

Minnesota Utilities

Electricity



Natural Gas

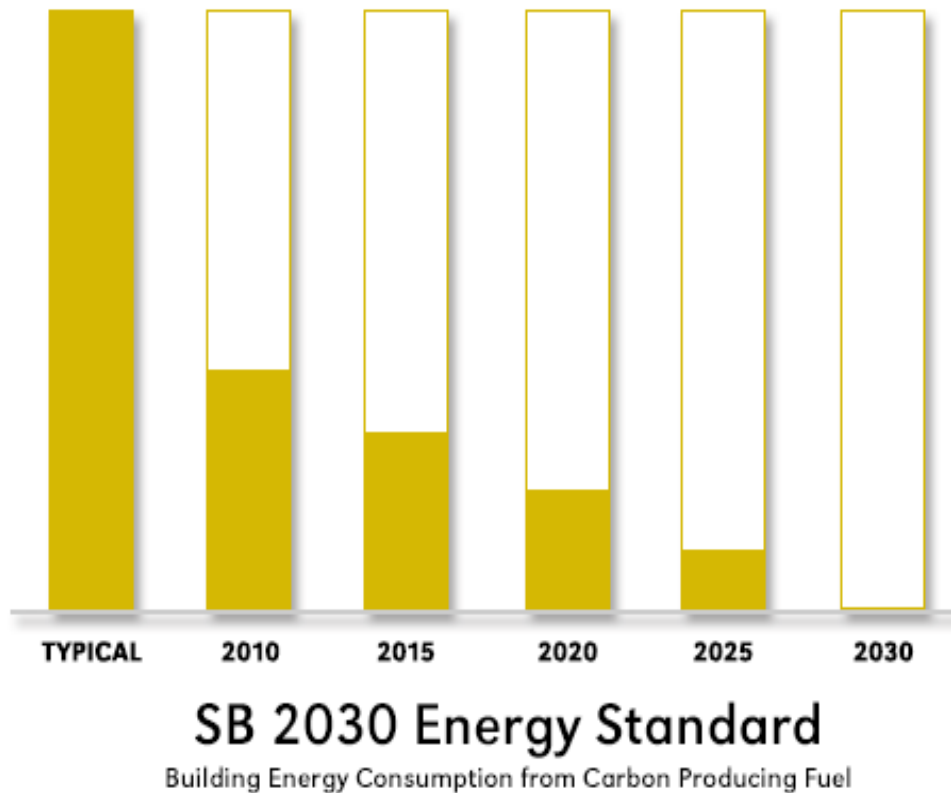


GEB-Related SEO Initiatives

- Sustainable Buildings 2030
- Conservation Improvement Program
- Pay-for-Performance



Sustainable Buildings 2030



REQUIREMENT

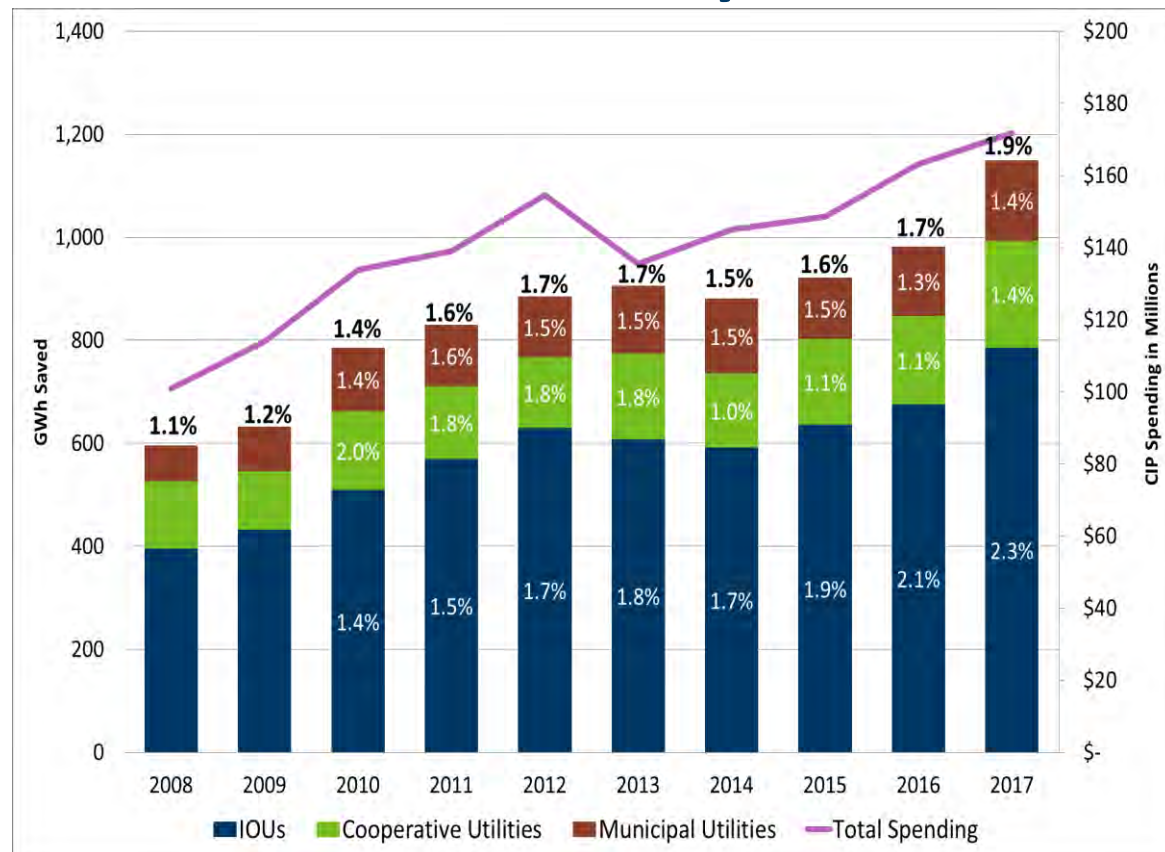
Meet energy performance targets (Energy Standards) that reduce the use of carbon producing fuel for building operations* by:

- 60% (for buildings designed) in 2010
- 70% in 2015
- 80% in 2020
- 90% in 2025
- 100% in 2030

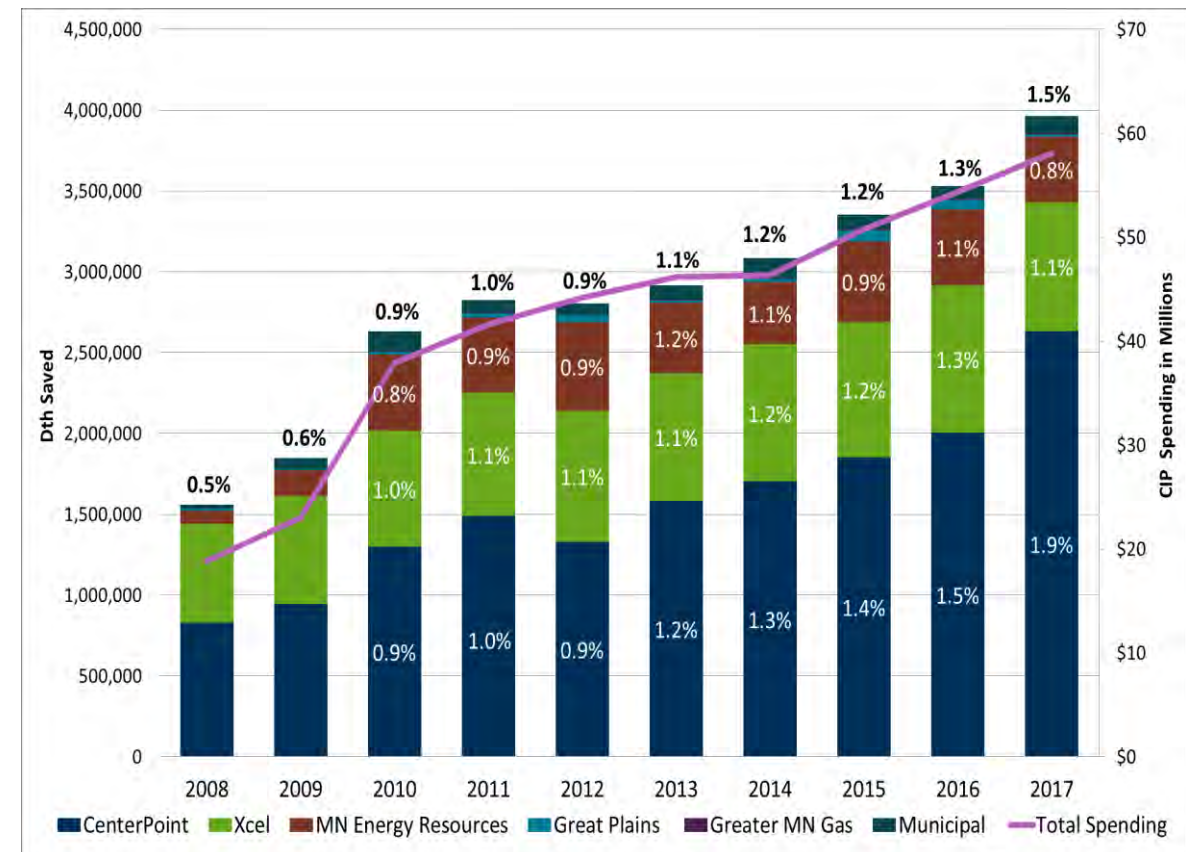
*from a baseline of representative buildings in existence in 2003

Conservation Improvement Program (CIP)

Electricity



Natural Gas



Positive Impact

- CIP incentivizes purchase of efficient equipment
- Reduces energy usage through educational outreach/behavioral programs
- Incidental peak reduction

Restrictive Impact

- Load shifting programs not permissible
- Fuel switching prohibited

Pay-For-Performance

- Compensate building owners for energy performance over time, as opposed to a one-time incentive given upfront for design and equipment decisions.
- Building owners have the potential to receive a larger incentive compared to the traditional one-time, upfront incentive.
- Helps keep energy use optimized over time.
- Potential barrier to participation is the uncertainty of future performance as building owners weigh the likelihood of hitting energy use targets.

- Minnesota Integrated Resource Plans

- Used to determine:
 - Size, type and timing of energy needs and resources
 - Least cost supply, energy efficiency, and demand response options considering environmental effects
- All G&T utilities file roughly every two years, including
 - 5-year action plan (near-term actionable investments)
 - Planning horizon of 15 years

Minnesota PUC – Rate Design

- Rate Design
 - Time-of-use Rates
 - Xcel Energy residential pilot – 15,000 participants
 - Minnesota Power C&I pilot
 - Interruptible tariffs
 - Provide commercial and industrial customers a lower electricity rate in return for the ability to curtail demand during emergency events

Minnesota GEB: Next Steps

- Participation in NASEO/NARUC working group
- SEO restructuring
- Administrative options for CIP modernization
 - Electrification action plan development (U.S. DOE funded)
 - Fuel switching stakeholder process
 - Load shifting study (Slipstream)

Thank You!

Anthony Fryer

Conservation Improvement Program Coordinator
Minnesota Commerce Department
anthony.fryer@state.mn.us – 651.539.1858

U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

Grid-interactive Efficient Buildings

MEEA Annual Meeting

Monica Neukomm

Building Technologies Office, DOE

www.energy.gov/eere/buildings/geb



US BTO approach

BTO invests in energy efficiency & related technologies that make homes and buildings more affordable and comfortable, and make the US (and beyond) more sustainable, secure and prosperous. Budget ~US\$226M/year; activities include:



R&D

Pre-competitive, early-stage investment in next-generation technologies



Integration

Technology validation, field & lab testing, metrics, market integration



Codes & Standards

Whole building & equipment standards technical analysis, test procedures, regulations



Our Homes and Buildings



There **124 million buildings** in America.

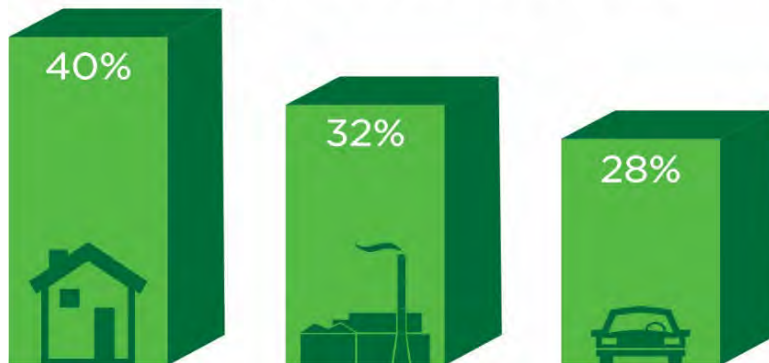
They use:

- **40%** of US energy
- **75%** of electricity
- up to **80%** of peak power



More than 80% are 20 years old or older.

Our Homes and Buildings Use More
Energy than Any Other Sector



Buildings' energy bill is **\$415 billion annually**, much of which is wasted

Source: EIA Monthly Energy Review;; U.S. Energy Information Administration (CBECs 2012/RECS 2015); NAREIT Reits by the Numbers; Census Bureau Quarterly Retail E-Commerce Sales 4th Quarter 2016

Flexible building loads



Provide options to increase electricity system reliability & energy affordability



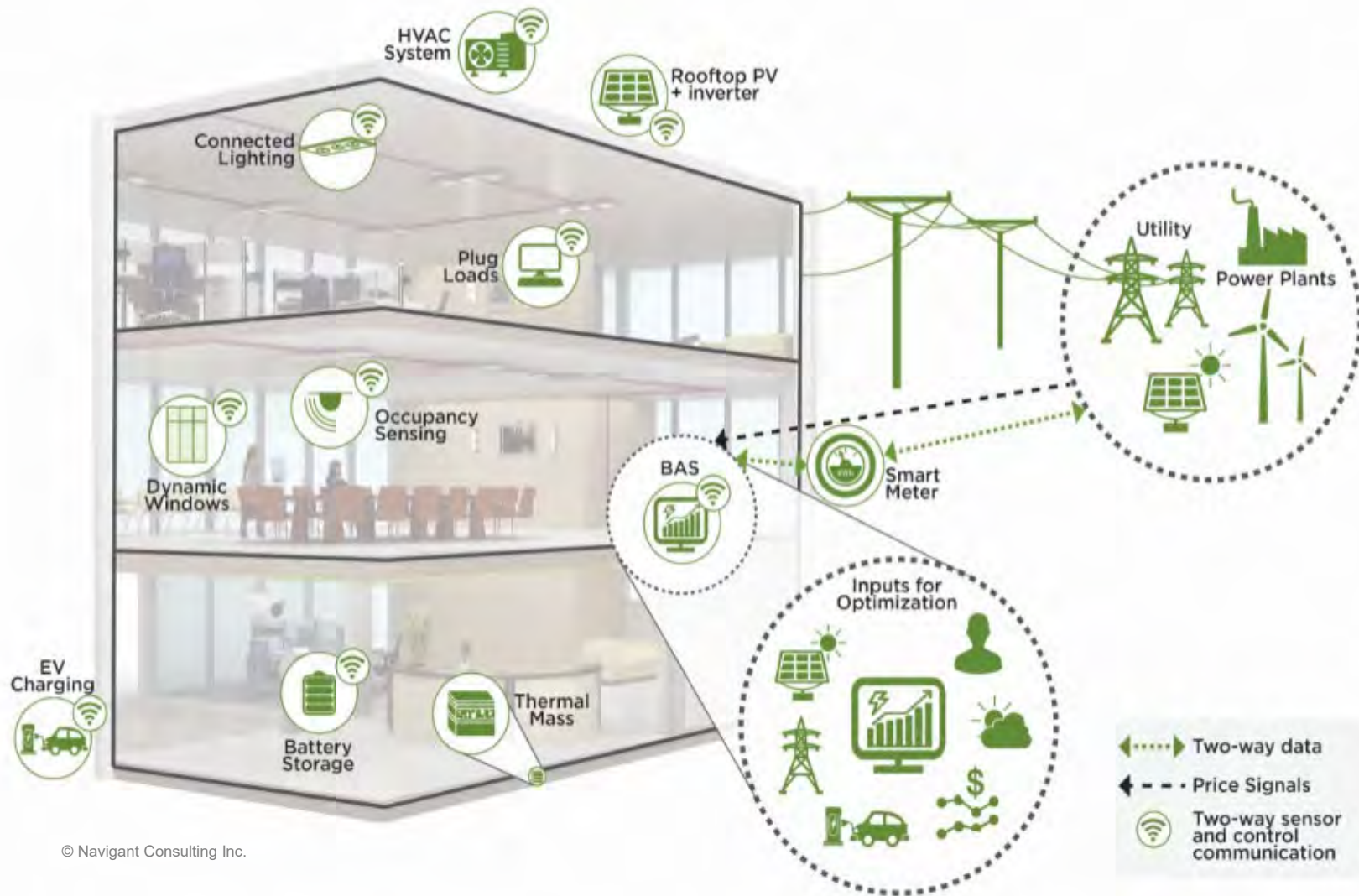
Support renewables & all generation options resulting from grid modernization



Optimize energy use based on customer preferences

Respond to innovations in the energy economy

Grid-interactive Efficient Building



Key Characteristics of GEB



EFFICIENT

Persistent low energy use minimizes demand on grid resources and infrastructure



CONNECTED

Two-way communication with flexible technologies, the grid, and occupants



SMART

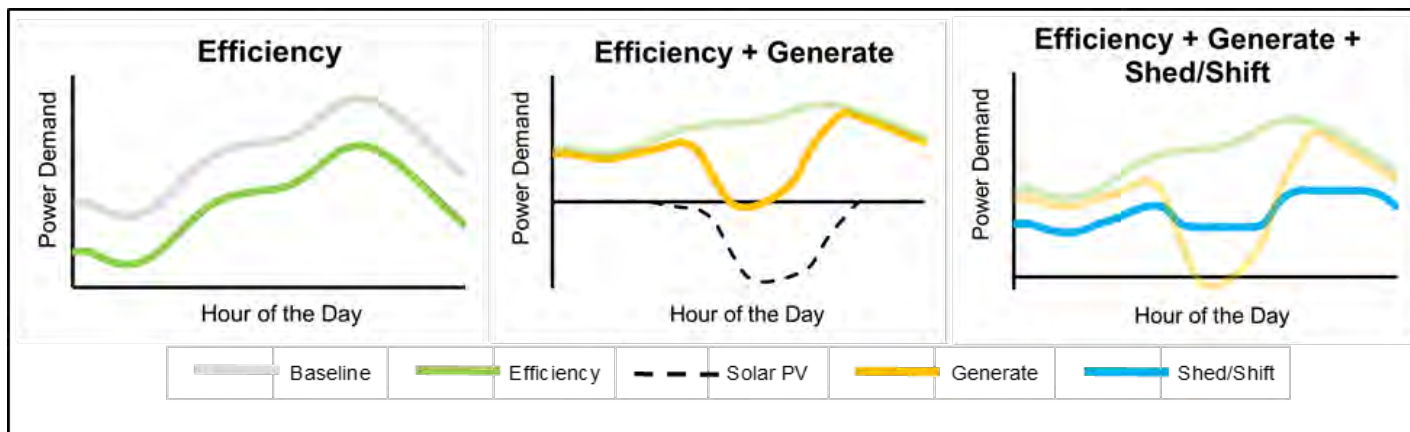
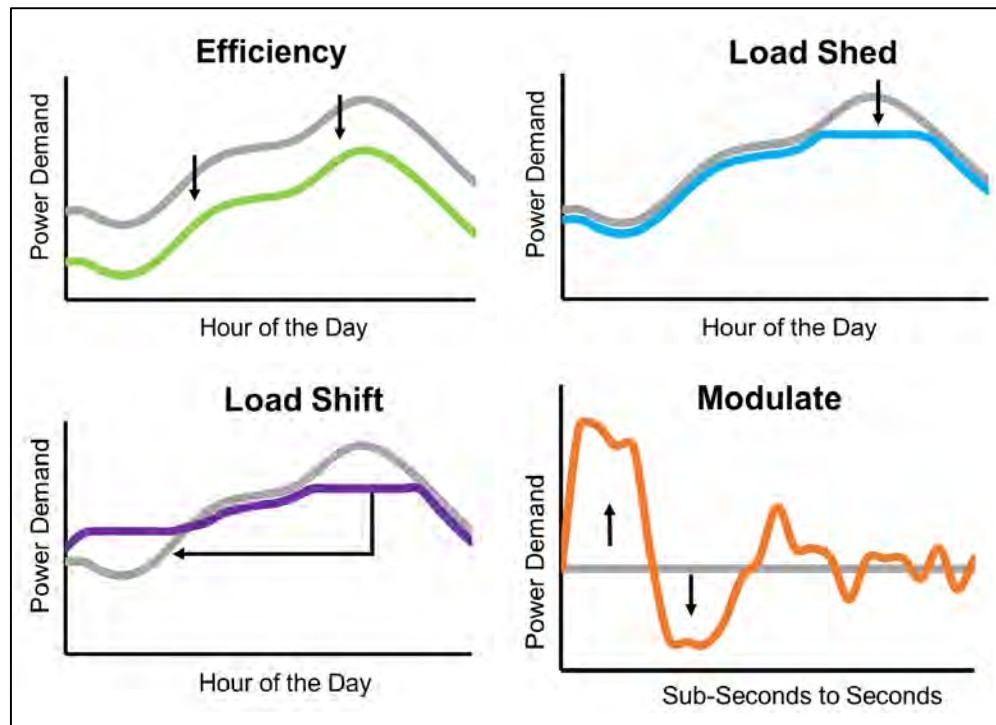
Analytics supported by sensors and controls co-optimize efficiency, flexibility, and occupant preferences



FLEXIBLE

Flexible loads and distributed generation/storage can be used to reduce, shift, or modulate energy use

Demand Flexibility Provided by GEB



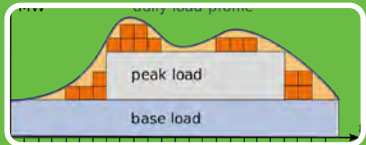
Potential Grid Services Provided by Demand Flexibility in Buildings

Grid Services	Potential Avoided Cost	Potential Market Size Addressable by Demand Flexibility in Buildings
Generation Services		
Generation: Energy	Power plant fuel, operation, maintenance, and startup and shutdown costs	Large
Generation: Capacity	Capital costs for new generating facilities and associated fixed operation and maintenance costs	Large
Ancillary Services		
Contingency Reserves	Power plant fuel, operation, maintenance, and associated opportunity costs	Moderate
Frequency Regulation	Power plant fuel, operation, maintenance, and opportunity costs associated with providing frequency regulation	Small
Ramping	Power plant fuel, operation, maintenance, and startup and shutdown costs	Small
Delivery Services		
Non-Wires Solutions	Capital costs for transmission & distribution equipment upgrades	Moderate
Voltage Support	Capital costs for voltage control equipment (e.g., capacitor banks, transformers, smart inverters)	Small

Potential Benefits of Flexible Building Loads



✓ Energy Affordability



✓ Improved reliability



✓ Reduced grid congestion



✓ Enhanced services

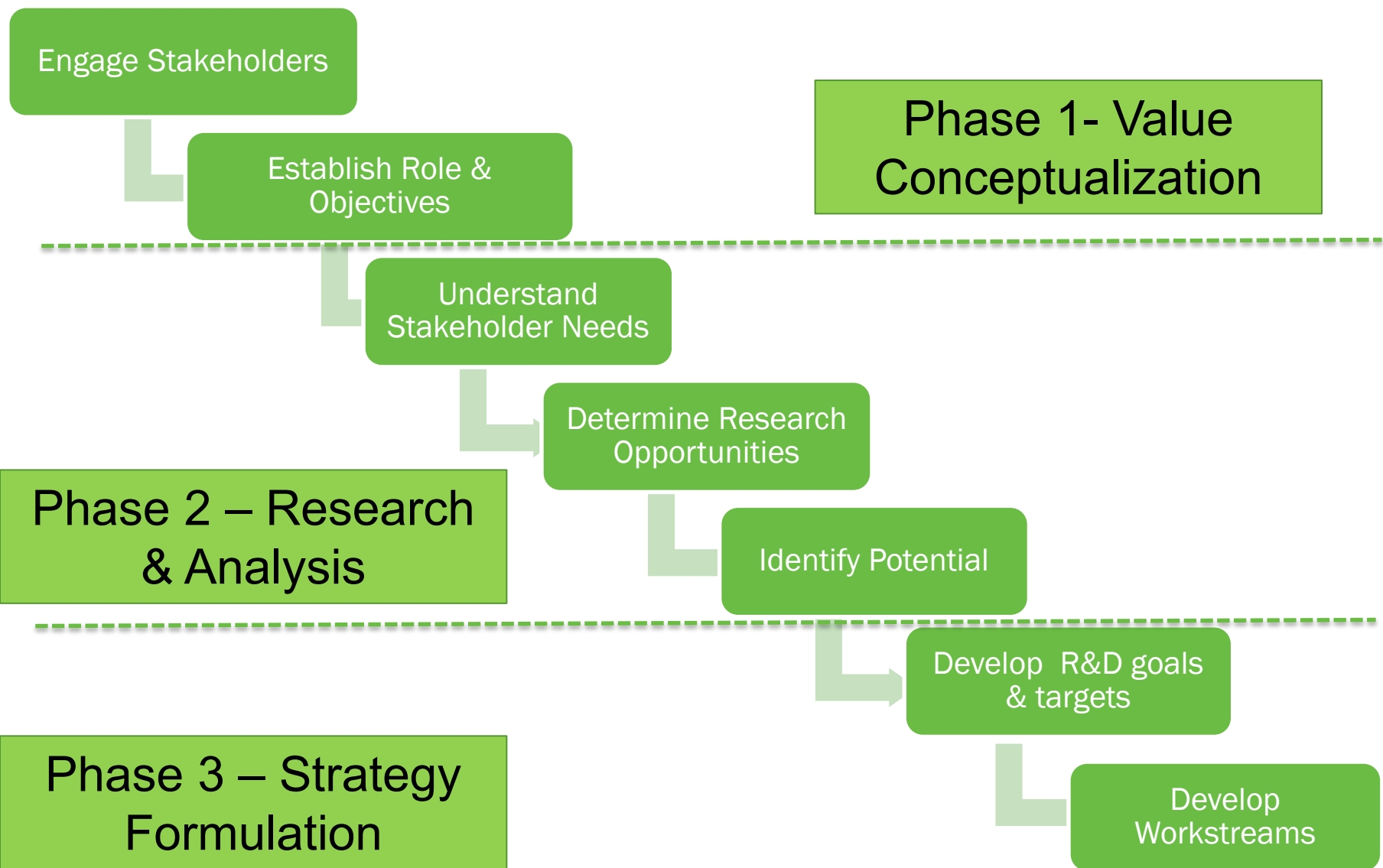


✓ Environmental benefits



✓ Customer choice

GEB Strategy Update and Next Steps



Research & Analysis: Determine Research Opportunities

The GEB Technical Report Series will help inform and guide BTO's R&D portfolio and serve as a foundational resource for the larger building research community

Reports will be published in Summer 2019 in partnership with Navigant, NREL, PNNL

GEB Technical Report Series:

- Overview
- Heating, Ventilation, & Air Conditioning (HVAC); Water Heating; and Appliances
- Lighting
- Building Envelope & Windows
- Sensors & Controls, Data Analytics, and Modeling

1

Establish Frameworks

- Defines grid-interactive efficient buildings and demand flexibility
- Establishes potential grid services and some basic requirements for buildings to provide needed flexibility

2

Assess Flexibility Potential

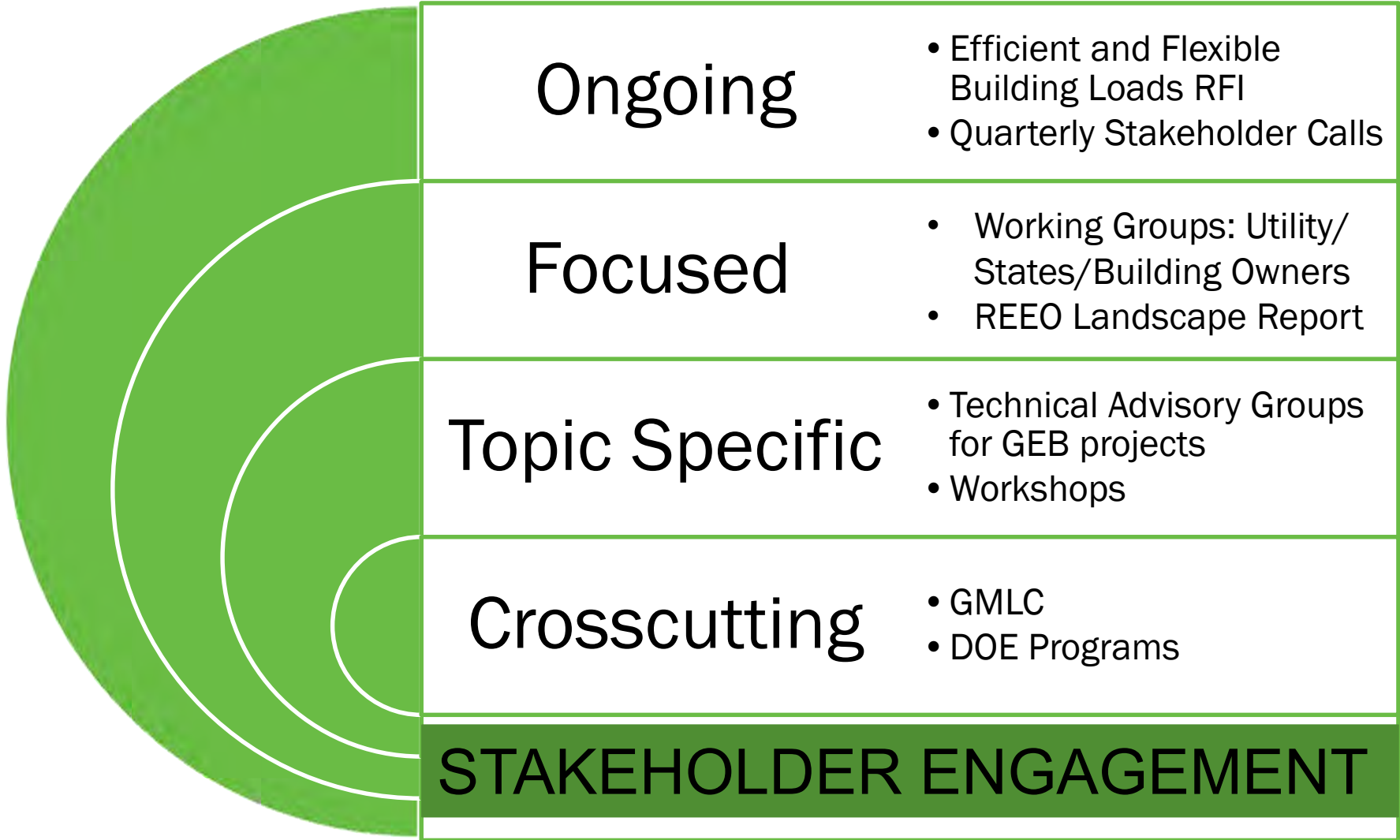
- Evaluate state-of-the-art and emerging building technologies that have the potential to provide grid services
- Considers implementation attributes

3

Discuss Research Opportunities

- Identify major research challenges of technologies with significant potential for grid benefits and opportunities for additional technology-specific research and development.

Research & Analysis: Understand Stakeholder Needs



Identify Potential

GEB Technical Report Series
establishes demand flexibility
modes and potential grid services
along with associated grid
requirements

Metrics Projects
establishes flexibility metrics for
both measurement & grid
requirements
3 year projects; Metrics will be
finalized by September 2019

SEE Action Report Series

metrics and attributes included in
the report on assessing
performance
Reports will be completed in 2019-
2020

GEB Potential Study

will establish GEB potential with
peak and overall reduction
measurement
Complete in September 2019

Technology Characteristics

establishes attribute framework
Multi-lab effort
May expand to standardize
attribute options across framework

BTO's grid-interactive efficient buildings portfolio

VALUATION

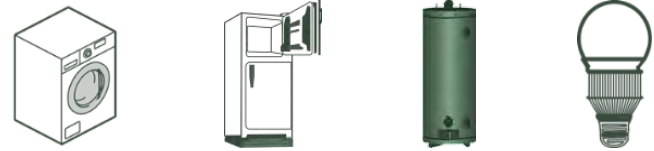
How do time & the interaction of flexibility options impact value?



Identify values to stakeholders, quantification of national value.

TECHNOLOGY OPTIONS

Which end use technologies provide solutions to specific grid needs?



Prioritize technologies / solutions based on grid services.

OPTIMIZATION

How to maintain or improve services while optimizing for flexibility?



Solutions that meet grid operator & building occupant needs.

VALIDATION

Do technologies perform as predicted and meet grid & occupant needs?



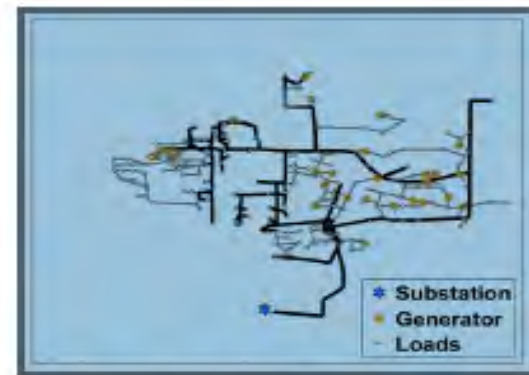
Verification of technologies / strategies, increasing confidence in the value of energy flexibility.

Collaboration across DOE offices and activities

- GEB visions focuses on the integration and optimization of DERs – including EE, DR, solar, EVs, and battery storage.
- Example Collaboration (SETO Project with BTO Support): AI Smart Communities
- Rooftop Solar, Batteries, foresee
- GW scale modeling and simulation over 400 homes
- 20-40 home field validation planned in Fort Collins, CO
- Community aggregation across neighborhood to minimize solar curtailment
- In partnership with Thrive HomeBuilders and City of Fort Collins (municipal utility)



Community distribution network model



Distribution feeder model

Questions & Challenges

- ☐ How do grid-interactive efficient buildings fit into broader renewables integration and grid modernization?
- ☐ What are the top priority benefits that buildings provide the grid?
- ☐ How critical are better
 - Technologies? Analytics? Policies & programs?
- ☐ What are key barriers to adoption of advanced controls, technologies, practices?
 - Making the case? Complexity? Cybersecurity concerns?
- ☐ Will efficiency get its ‘fair share’?
- ☐ Is this a ‘bridge too far’ (at least today) for buildings, utilities, utility regulators, governments?
- ☐ How to best work with other national, state governments

U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

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Utility Grid Modernization



David South
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June 19, 2019

BUSINESS
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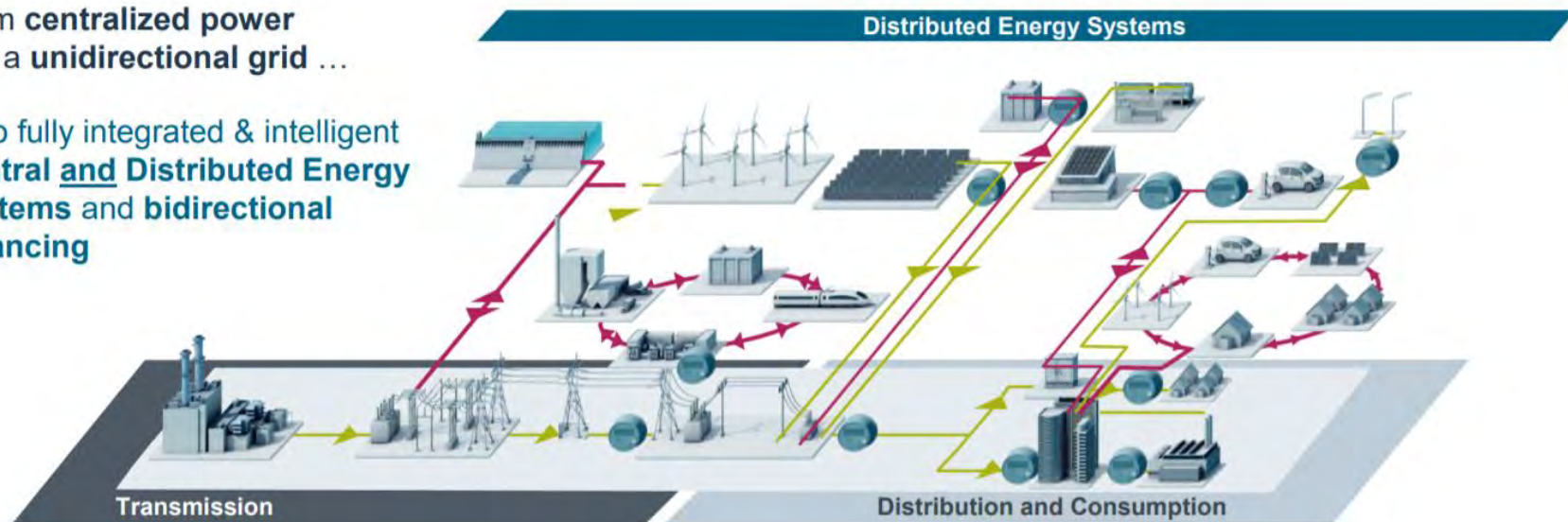
DEEP
TECHNOLOGISTS



Transformation of the Grid is underway...

From **centralized power**
and a **unidirectional grid** ...

... to fully integrated & intelligent
**Central and Distributed Energy
Systems** and **bidirectional
balancing**



A **smart grid** is an electrical **grid** which includes a variety of operation and energy measures including **smart** meters, **smart** appliances (IOT), renewable energy resources, and energy efficient resources.



Grid Modernization encompasses all the changes needed in the generation, transmission and distribution of electric power to deliver resilient, reliable, flexible, secure, sustainable, and affordable electricity

Utilities are being asked to transform their traditional business model to adapt to new customers' expectations and meet Grid Modernization objectives....and do it quickly





To meet our aggressive GHG goals, the Grid needs to undergo a major transformation to accommodate DERs deployment at scale



The Grid needs to support thousands of small-scale DERs coming online daily



The Grid needs to manage and gain access to third-party owned DERs



The Grid must become flexible and dynamic to handle intermittent load

... while reducing interconnection costs



More energy is being supplied by a portfolio of local, distributed resources, adding complexity to grid planning and operations



The Grid needs to control DERs individually and/or in aggregates



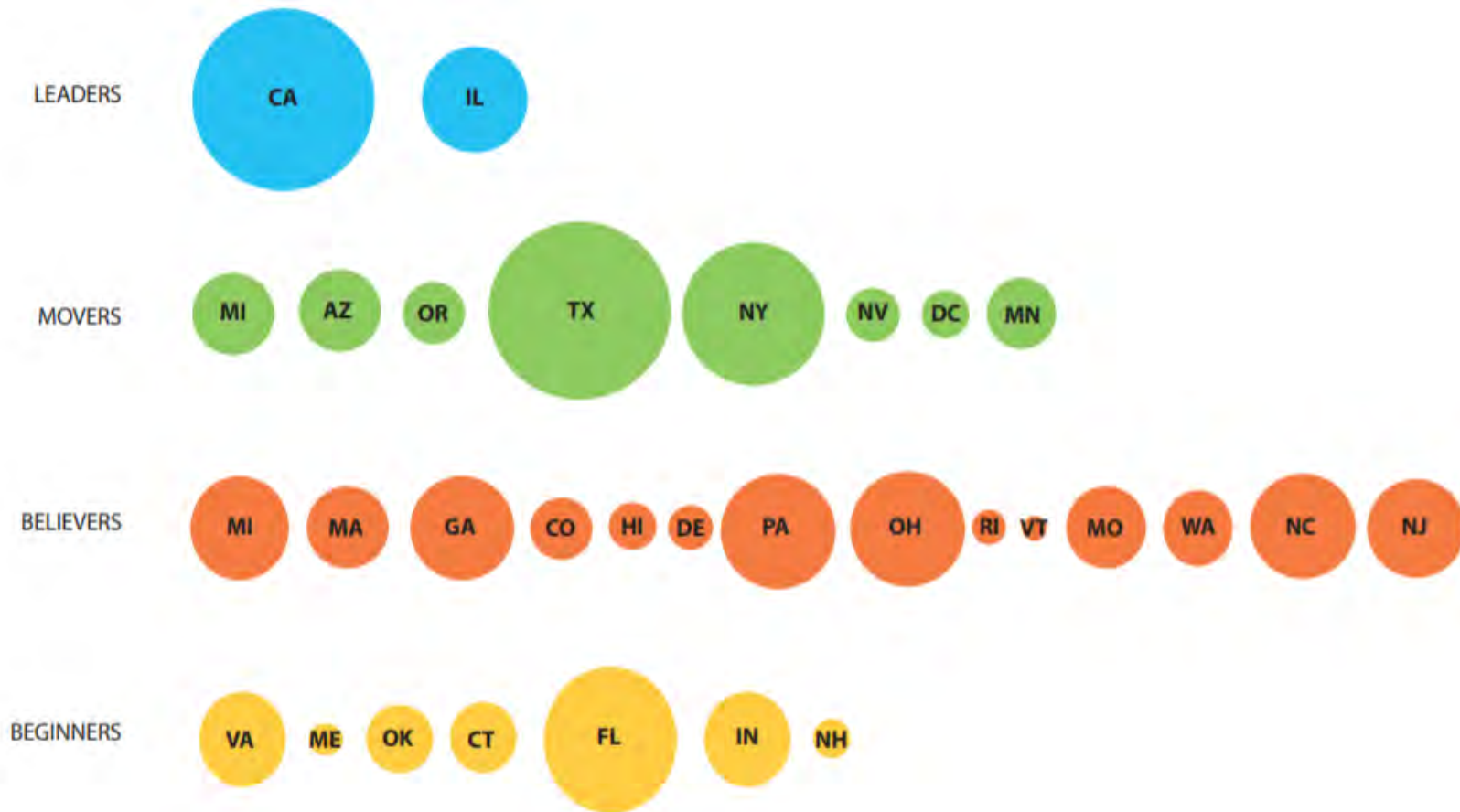
Some DERs have two-way power flow



The Grid must have visibility over all DERs and be flexible and dynamic

... while maintaining a safe and reliable Grid

Grid modernization activity is happening in states of all sizes and market structures



Source: Grid Modernization Index 2018, GridWise Alliance

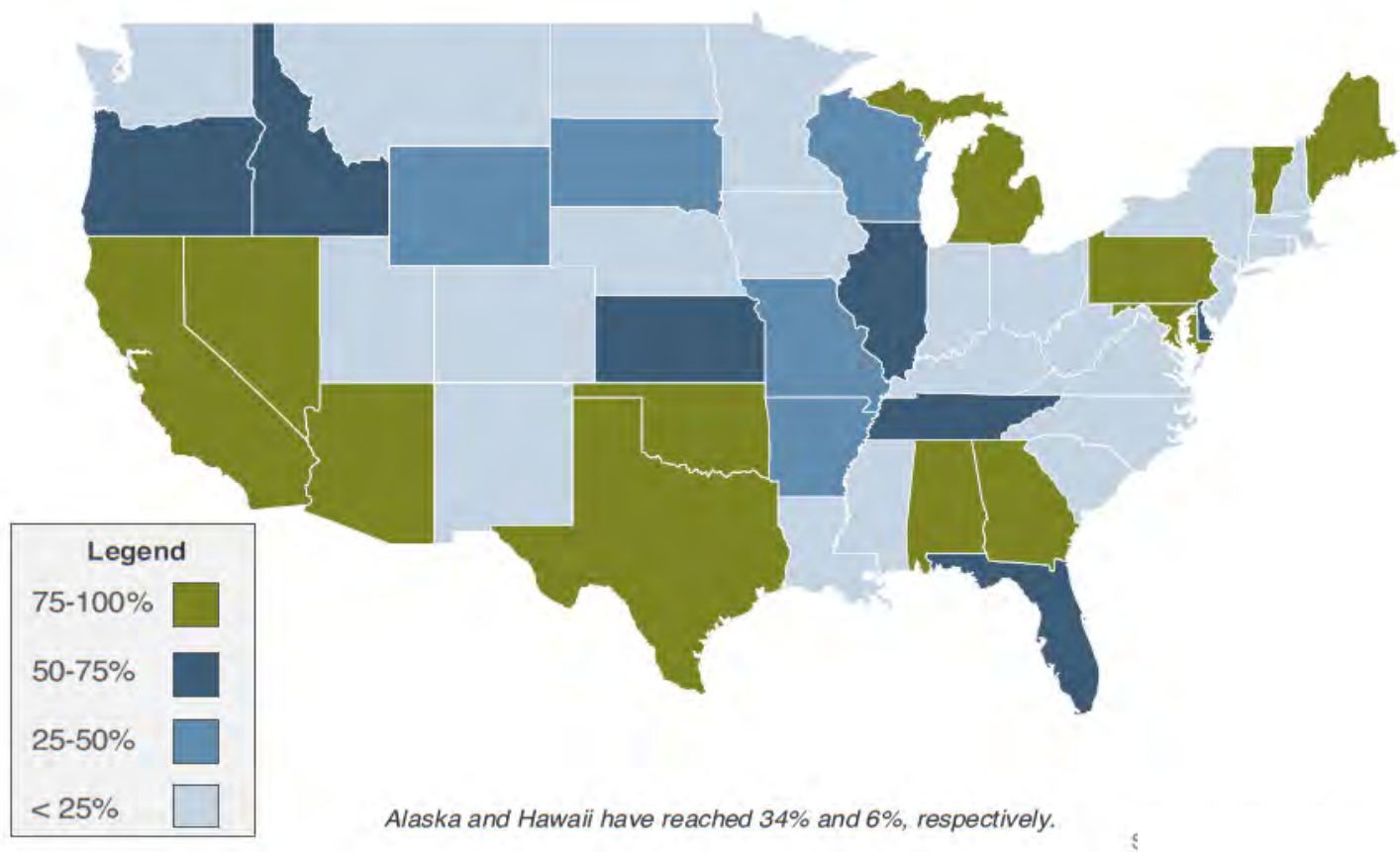
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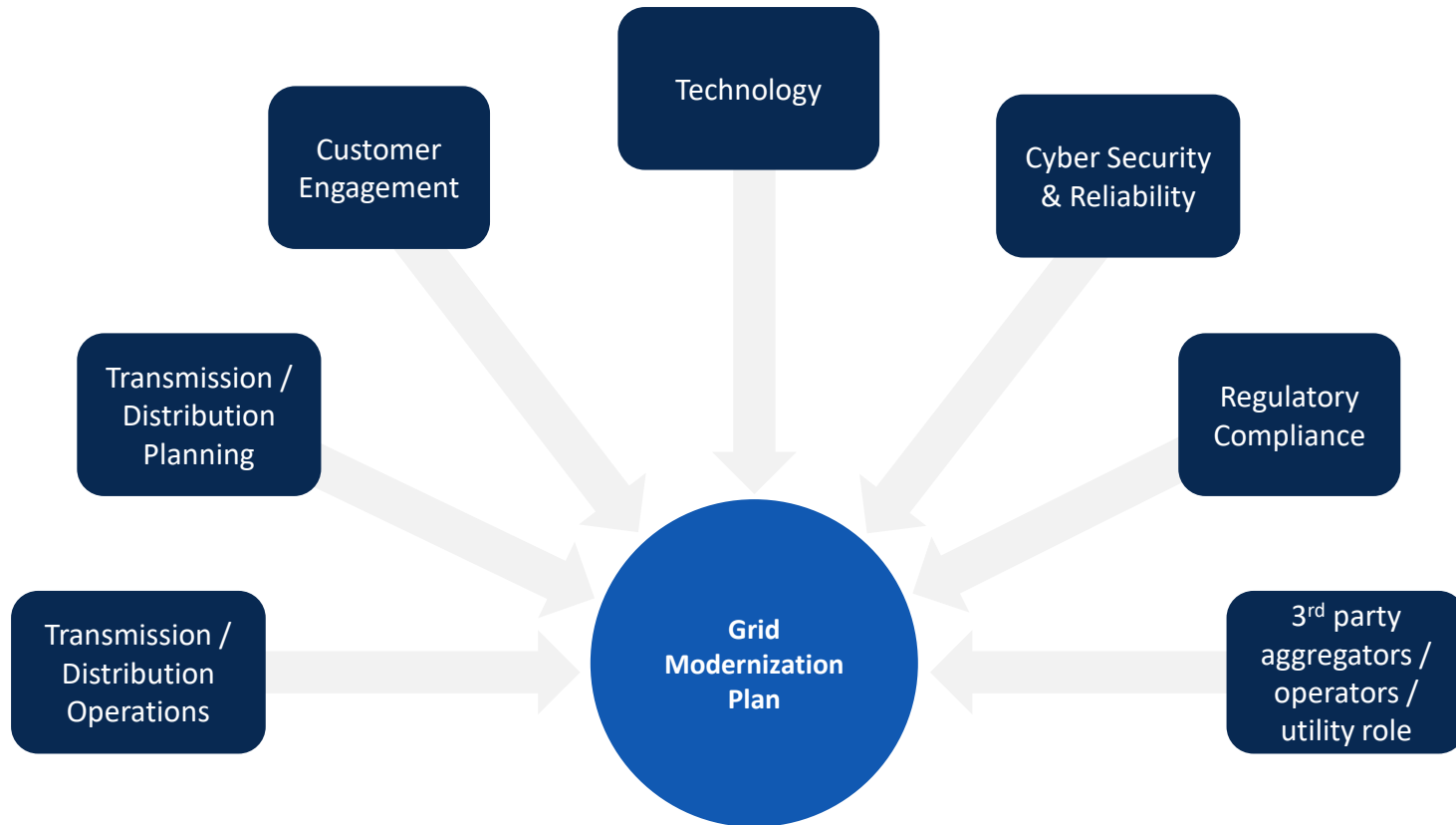
Grid Modernization Drivers

- ◆ **American Recovery and Reinvestment Act of 2009 (ARRA)**
 - Provided DOE with \$4.5 billion to modernize the electric power grid
 - Under the Smart Grid Investment Grant (SGIG), DOE and the electricity industry jointly invested \$8 billion in 99 cost-shared projects involving more than 200 participating electric utilities and other organizations to *modernize the electric grid, strengthen cybersecurity, improve interoperability, and collect an unprecedented level of data on smart grid operations and benefits*
- ◆ **State Programs**
 - CA
 - NY—Reforming the Energy Vision (REV)
 - MN—e21
 - IL—NextGrid
 - OH—PowerForward
 - WI--tbd

AMI penetration by state, as of 2017



The next phase of Grid Modernization will require a coordinated and integrated plan to focus on all these areas



HOW THE GRID WILL OPERATE IN THE FUTURE

Transformation to an information-enabled and highly interconnected network between electricity Suppliers and Consumers



Move From...

- Limited Consumer Choice
- One-Way Communication
- Few Sensors & Analog Controls
- Reactive Maintenance
- Blind to Events

To...

- Many Consumer Choices
- Two-Way Communication
- Digital Monitoring & Controls
- Condition-Based Maintenance
- Self-Monitoring and Self-Healing

Result...

- Consumer Control & Convenience
- Innovation
- Efficiency
- Simplicity
- Competitive Marketplace

US smart grid: key takeaways

AMI market in the US is well developed but not yet saturated	The US has the largest installed base of AMI meters in the world (China primarily has AMR meters). But AMI penetration has only recently reached 50% and there are still enormous market opportunities.
Federal SGIG program was a major source of investment	The federal Smart Grid Investment Grant program (SGIG) ran from 2010 to 2015 and led to nearly \$8 billion in smart grid investment and over 16 million smart meters deployed across the US. Investment slowed after completion of the program, but is beginning to pick up again.
Several major US utilities have not deployed smart meters	Some of the largest electric utilities in the US, both investor-owned and municipal, have installed less than 5% smart meters across their residential customer base.
Regulations are state-based and vary widely	Differing state regulations have led to a select few states completing rollouts while many more have either not begun or have made very little progress. State PUCs will help determine the pace at which smart grid deployments grow.
The DA market continues to grow and converge with the AMI market	DA infrastructure investment continues to grow and is increasingly converging with AMI as DA devices—such as line sensors, voltage regulators, capacitor banks, and others—are connected via AMI communications networks.

The Future is:

Smart power +

Smart grids +

Smart buildings





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Bill Angelos

MEEA Deputy Director



Please join us for a tour of
Kauffman Stadium,
Home of the Kansas City Royals

sponsored by Leidos