VAEEC 2021 ENERGY EFFICIENCY FORUM

Improving Building Performance Across Sectors

November 15th, 2:40-3:55 pm

Sponsored by veic

David Nemtzow
DOE Building Technologies Office

Christian Placencia
DC Sustainable Energy Utility

Jennifer Rosenthal
TRC Companies

Elizabeth Beardsley
US Green Building Council
Moderator

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Christian Placencia
Manager, Program Management Office

Low-Income Decarbonization Pilot (LIDP) Program – Electrifying Affordable Housing in DC

DC SUSTAINABLE ENERGY UTILITY
YOUR GUIDE TO GREEN

DC's Sustainability Goals

ADAPT TO CLIMATE CHANGE

CLIMATE READY BUILDINGS

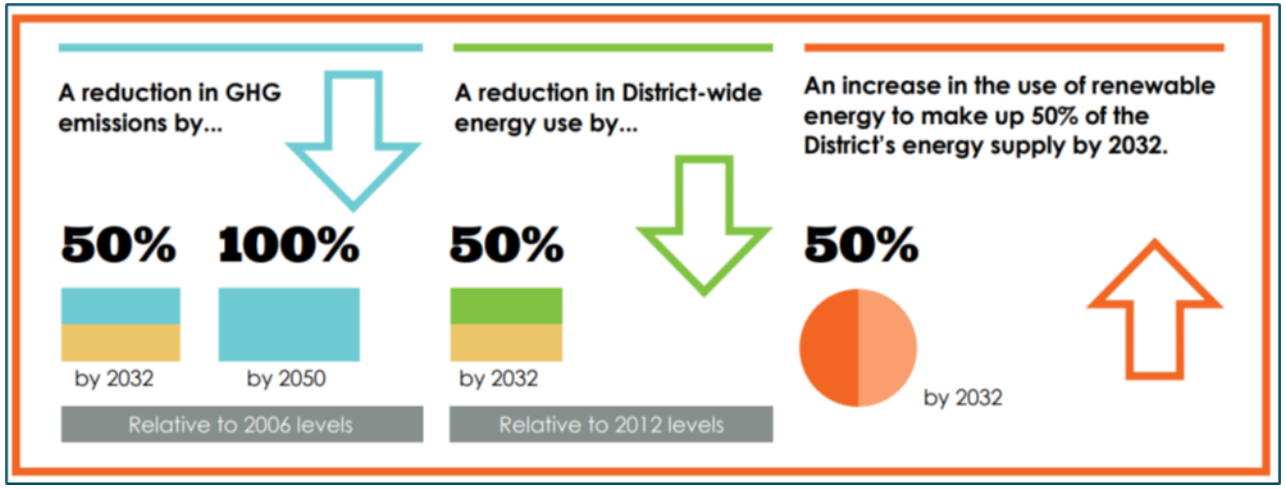
CUT ENERGY USE 50%

50% RENEWABLE ENERGY

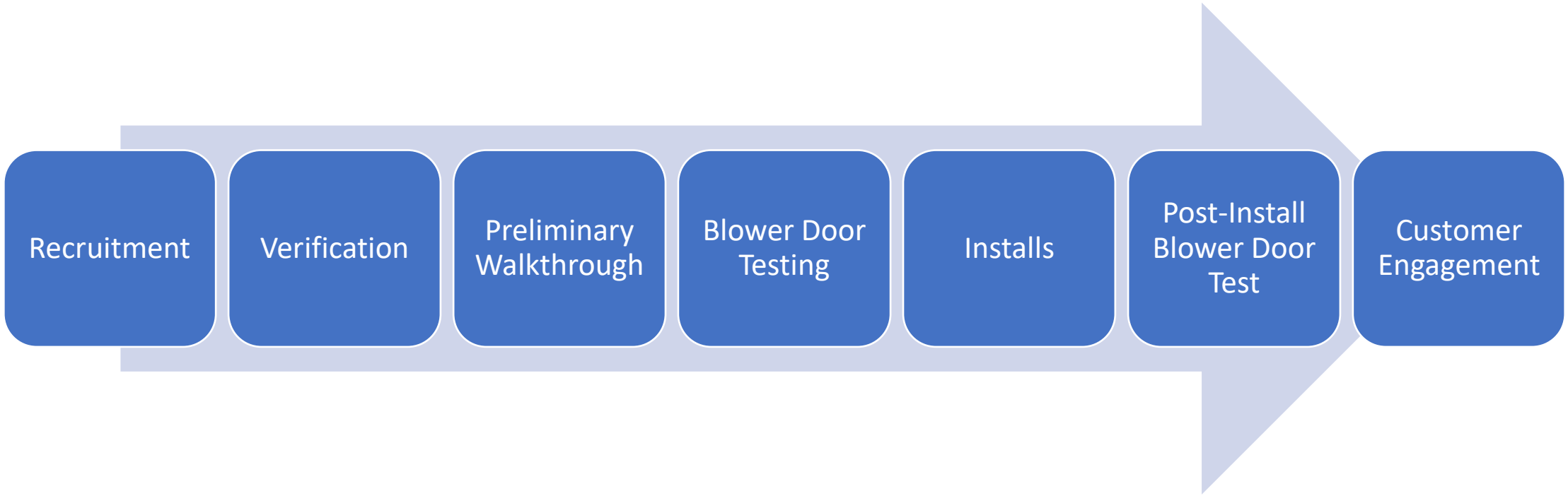
NET ZERO NEW BUILDINGS

NET ZERO RETROFITS

CUT GHG EMISSIONS 50%



LIDP Program Overview



Lessons Learned from Pilot

- Each home is unique causing pricing to vary
- Residents were not motivated to replace their gas stoves
- Almost all participants were very happy with their new systems

DC SUSTAINABLE ENERGY UTILITY
YOUR GUIDE TO GREEN

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From EE to BE

A Beneficial Electrification Success Story

VAEEC 2021 Energy Efficiency Forum

November 15, 2021

CLEAN

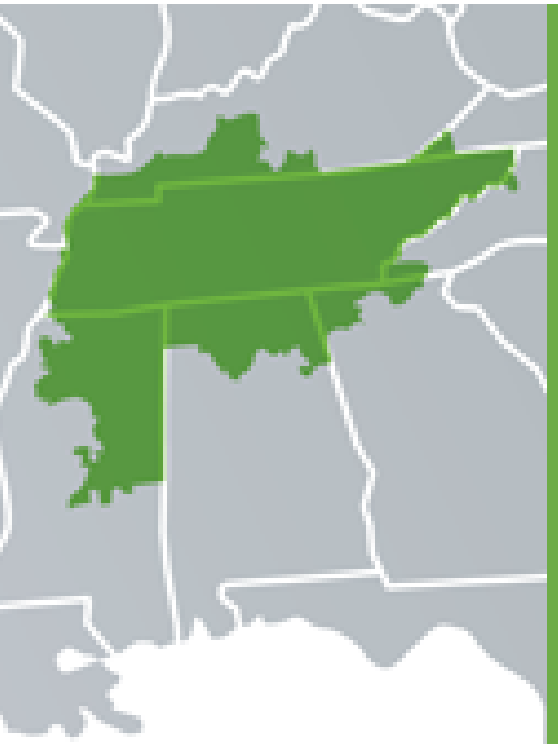
[DISTRIBUTED]

RESILIENT

Electrification – Where is it happening?

Today's Focus

Seattle City Light
Great River Energy
Green Mountain Power
Solaris Mass
Michigan IOUs
Coop
I&M
AEP Ohio
RI Thermal Program
Power District
Ameren
Tennessee Valley Authority
Duke Energy
Georgia Power
terPoint Energy



TVA was created by Congress in 1933 and charged with a unique mission – to make life better for the people of the Tennessee Valley through the integrated management of the region's resources. TVA has worked tirelessly to make life better for the people of the Tennessee Valley region.

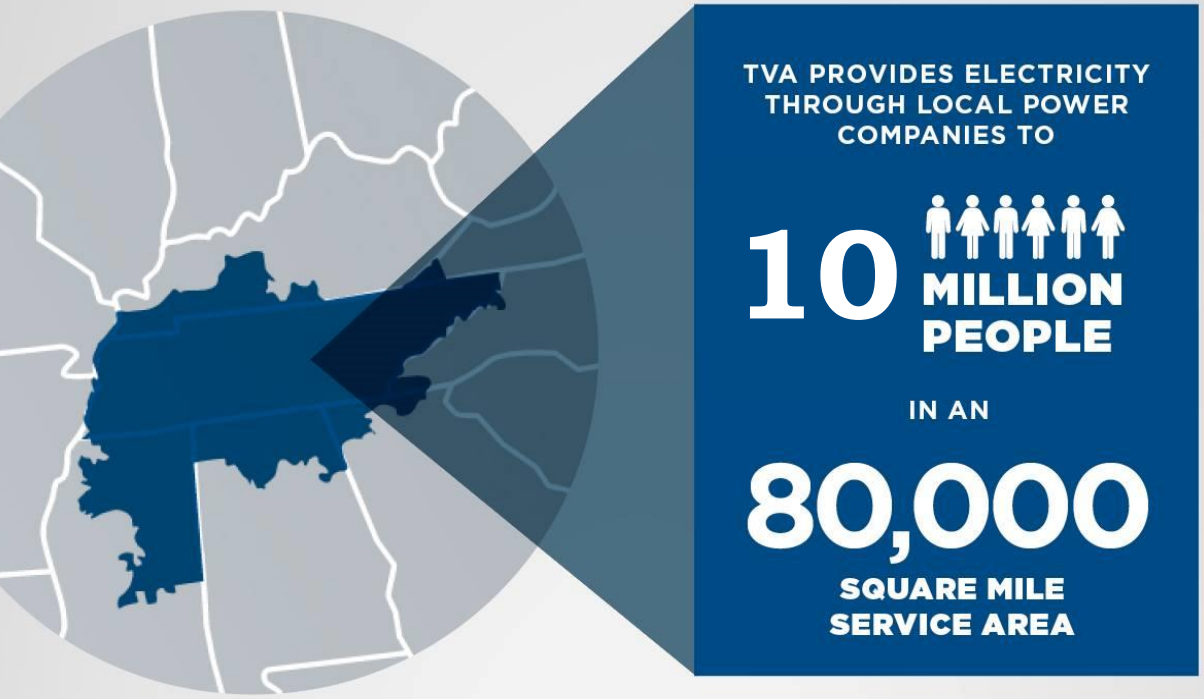
Electrification just 80 years ago…

Electrification Today

The power of the Tennessee Valley Authority

TENNESSEE VALLEY AUTHORITY

Mission of Service



7 states, 154 LPCs and 57 direct-served customers.

16,000 linear miles
of high-voltage power lines

99.999% Reliability
for 19 years consecutively

55% Carbon Free
generation portfolio by 2020

More than
60% Carbon Reduction
since 2005

Reaching the Mission through Electrification

Energy

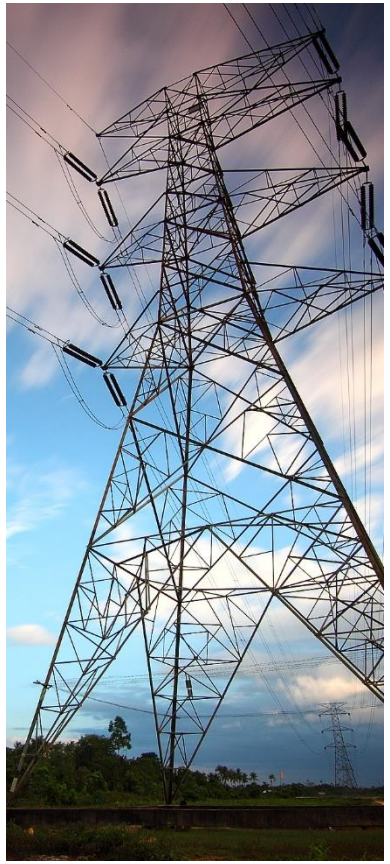
Provide affordable electric power throughout the Tennessee Valley Region

Environment

Act as a steward of the Valley's natural resources

Economic Development

Serve as a catalyst for Economic growth



Energy

Decreases the incremental cost for each unit of electricity while optimizing the system load shape.

Environment

Electrification reduces the emissions footprint.

Economic Development

Enables TVA to manage energy costs, keeping rates competitive and contributing to indirect local job growth.

Leading the Charge

TRC

TVA EnergyRight® BUSINESS & INDUSTRY

Incentives for smart energy technologies for commercial and industrial customers

Reliable, accurate **technical advice** to commercial and industrial customers

Tools & research to help commercial and industrial customers better manage their energy usage

Transition to electrification

Program Inception

TVA launches Commercial Efficiency Advice and Incentives. Program offers evaluations and rebates for HVAC and lighting. Limited to Commercial end-users in select geographic areas.

2009

2010

Program Expansion

TVA's EnergyRight for Business & Industry expands energy efficiency incentives to all commercial and industrial customer classes.

Program Partnerships

Expanded program launches a trade ally network, known as the Preferred Partners Network (PPN), to support program delivery.

2011

2014

Electrification

Program offerings expand to incentive offerings for select Non-Road Electric Vehicles (NREV), marking TVA's initial foray into Beneficial Electrification.

NREV – Initial Measures

Heavy-Duty Truck Stop Electrification (HD-TSE)

Ground Support Equipment

Forklifts

Electric Truck Refrigeration Units (eTRU)

Goal: Achieve 5% Aggregate Market Development

NREV - Results

CONVERSIONS

$36M program budget value resulted in conversion of **651** fossil-fueled units to electric powered alternatives and **24** electrification stations at truck stops.

CO_2 EMISSIONS

Net emissions of CO_2 reduced by **209,337 tons**.

Average incentive cost of emissions reduced of **$17/ton.**

LOAD GROWTH

Local Power Companies and TVA will realize net load growth of **9.4 GWh** and **$775,000** annually.

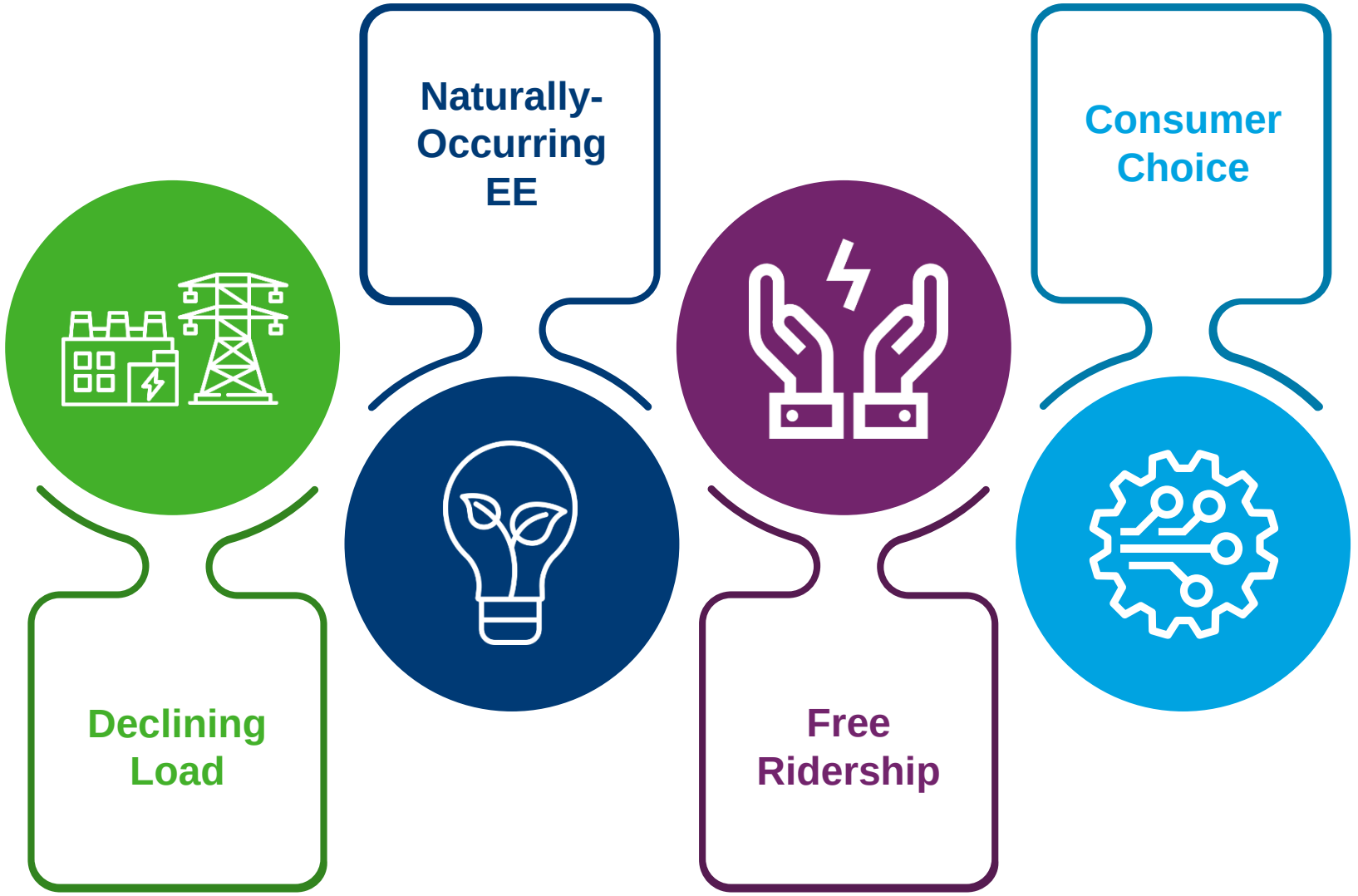
COST BENEFIT

Revenue will surpass the cost of incentives in **less than 5 years**.

Provides cost-effective economic and environmental benefits to TVA customers.

.

A Changing Market



Program Shift

Changing Market **Need Identified** **Solution Defined**

Smart Electric Technologies

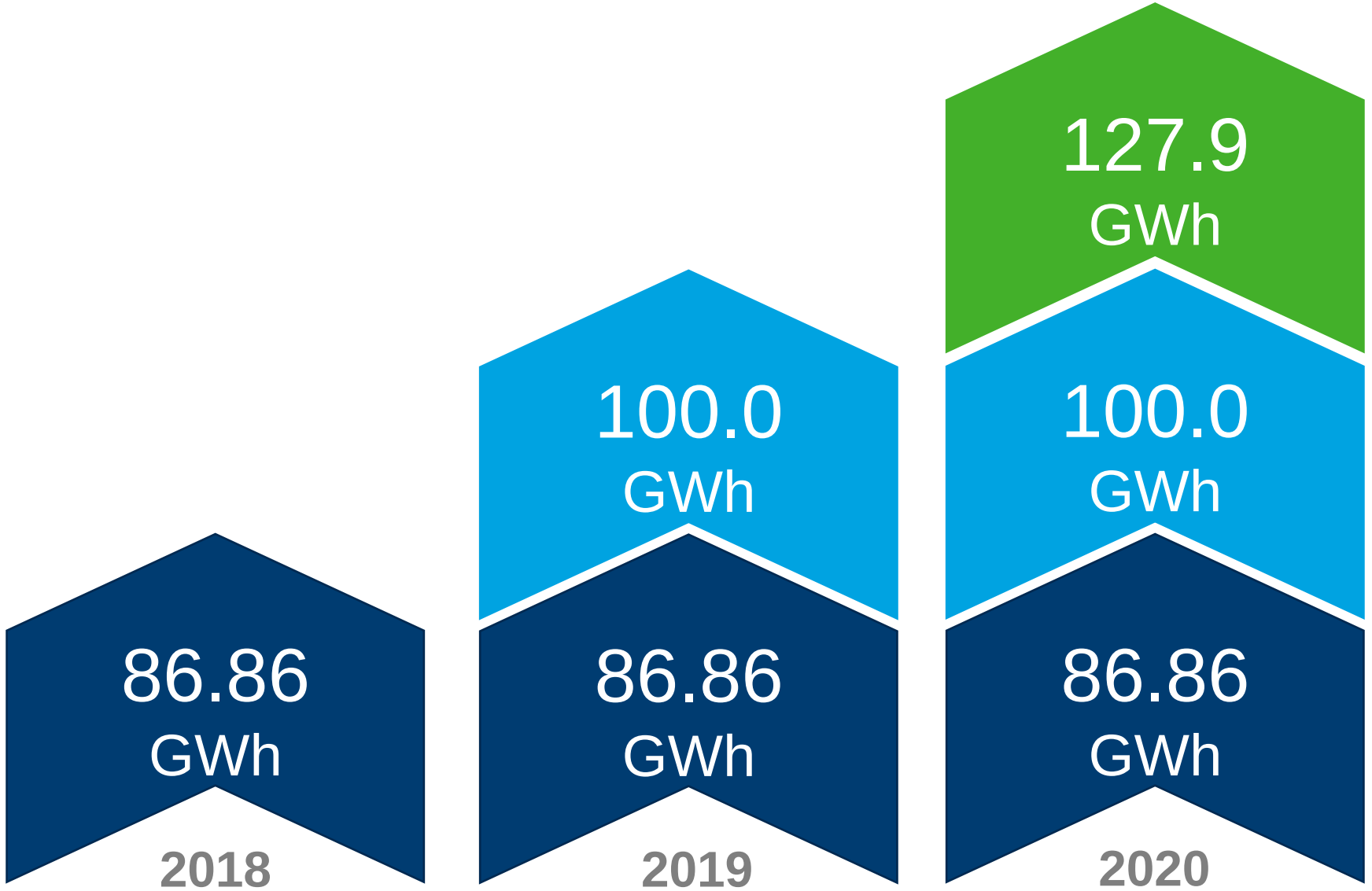
- Smart Electric Technologies **incentives expanded** to include:
  - Standard HVAC
  - Food Service
  - Custom Electrification
- Non-Road Electric Vehicles (NREV) **continues**

Total Transition

- Energy Efficiency **makes good business sense** without incentives
- Traditional Energy Efficiency Incentives **retired** July 1, 2018
- ERB&I continues to **support Energy Efficiency** through **engagement** and **education**

Measure expansion

Continued success, year after year…



Layering on for Success

Non-Energy Benefits

Smart Energy Technology

Energy Efficiency Programs

Preferred Partners Network

Leveraging Program Partners

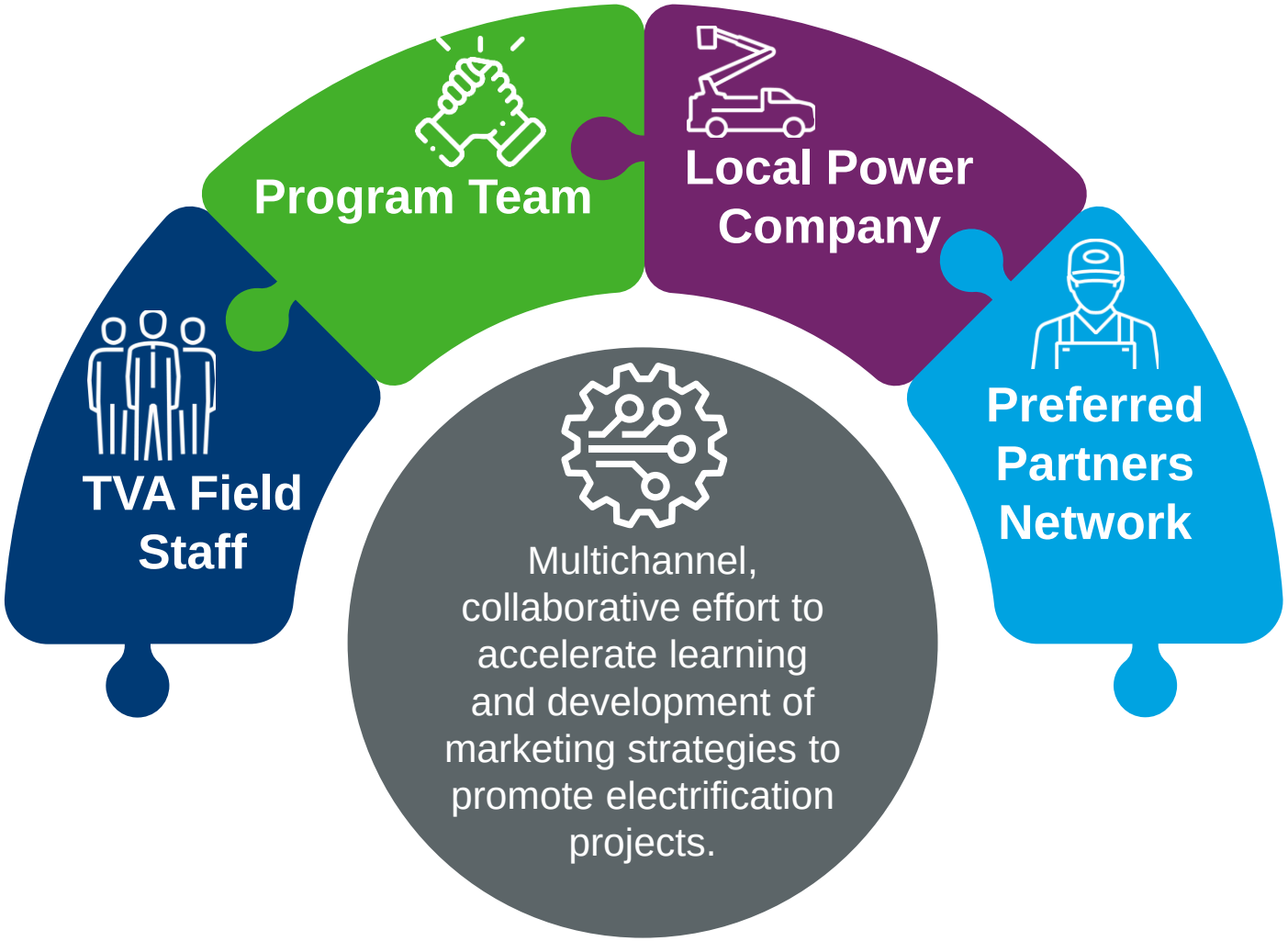
- Vendors and Contractors are the **sales experts**
- Bring their own **go-to-market strategy** and **merits**
- Incentives available to **open the door**

TVA EnergyRight®

PREFERRED PARTNERS NETWORK

TVA EnergyRight® BUSINESS & INDUSTRY

Collaborative Learning Approach



Objectives and Methodology

- Aligning TVA and partners in marketing electrification
- Collaborative understanding of education and barriers around implementation of electrification
- Maximize opportunities for electrification projects in the Tennessee Valley

- Key Technical Resources
- Face-to-Face Meetings and Trainings
- Access to Vendors and Experts
- Webinars
- Marketing Materials

Driving Success – Project Diversity

Sports Facilities

Hospitality

Education

Commercial Offices

Agriculture

Manufacturing

TVA EnergyRight® BUSINESS & INDUSTRY

Project Highlight

This **family owned farm** recently used the ERSB&I program to **replace an aging pivot irrigation system**. Originally powered by diesel, the old system was expensive to run and maintain. This farm was able to install **electric motors** that were more efficient and cheaper to operate than diesel.

Location: Mississippi

Facility Type: Agricultural

Measure: Process Improvement

Added Load: 158,135 kWh

Incentive Value: $15,813

Project Highlight

This **nonprofit school** not only trains students to become software developers within 12 months, they also provide 100% scholarships to every student. With our incentives, the school was able to **turn an old garment factory** into a **bigger campus** that will contain a new **business incubator** & satellite offices for business sponsors.

Location: Mississippi

Facility Type: Educational

Measure: Building Revitalization

Added Load: 700,000 kWh

Incentive Value: $140,000

Project Highlight

Originally, this facility used an **inefficient gas furnace** to forge forestry tools. The furnace had to operate 24/7 due to the six hour startup sequence needed to reach the temperature for the curing process. However, by leveraging program incentives, they were able to install **an efficient electric furnace** that could be shut off at night and during weekends.

Location: Tennessee

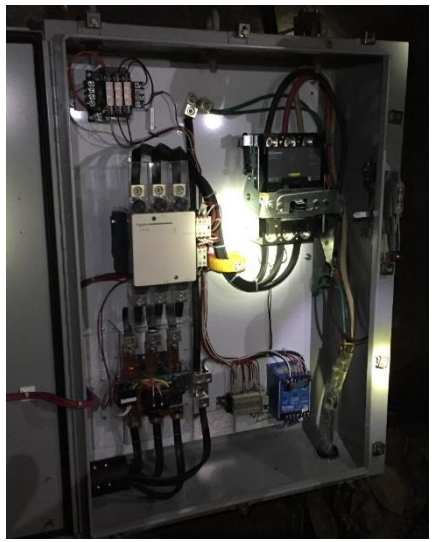
Facility Type: Industrial - Factory

Measure: HVAC

Added Load: 388,703 kWh

Incentive Value: $38,870

Project Highlight



A global metals company used costly **diesel-powered drills**, **bolters**, and **40 ton trucks** to mine and transport zinc ore. As the price of zinc dropped, mining operations were forced to halt for several years.

By adding electric equipment, including **5 conveyer systems**, production costs were lowered and over 2.2 miles of hauling distance were eliminated. Higher zinc prices and program incentives allowed the mine to **reopen**.

Location: Tennessee

Facility Type: Industrial - Mining

Measure: Process Improvement

Added Load: 2,831,598 kWh

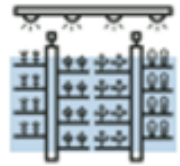
Incentive Value: $283,160

Looking to the Future… FY22

$250/ton
HVAC
Heat Pump

$2,000/purchased
$1,000/leased
Electric Forklifts

$25/ft²
Indoor Agriculture
(Pods/Containers,
New Construction)



$1/watt reduced lighting; $40/ton AC
Indoor Agriculture
(Vertical Farms,
Existing)

$30/ton
Ultraviolet
Germicidal
Irradiation

$0.03/kWh
Indoor LED Lighting
Replacement

Free training for large industries
Compressed Air Assistance

And Beyond!

Thank You

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U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Grid-Interactive Efficient Buildings: Are they Virginia's Future?

Energy Efficiency Forum 2021

VAEEC
VIRGINIA ENERGY EFFICIENCY COUNCIL

David Nemtzow
Director, Building Technologies Office
U.S. Department of Energy

November 15, 2021

Why Grid-interactive Efficient Buildings (GEBs)?

Integrate the growing share of variable renewable energy

Reduce costs to replacing aging electricity system infrastructure and improve system reliability

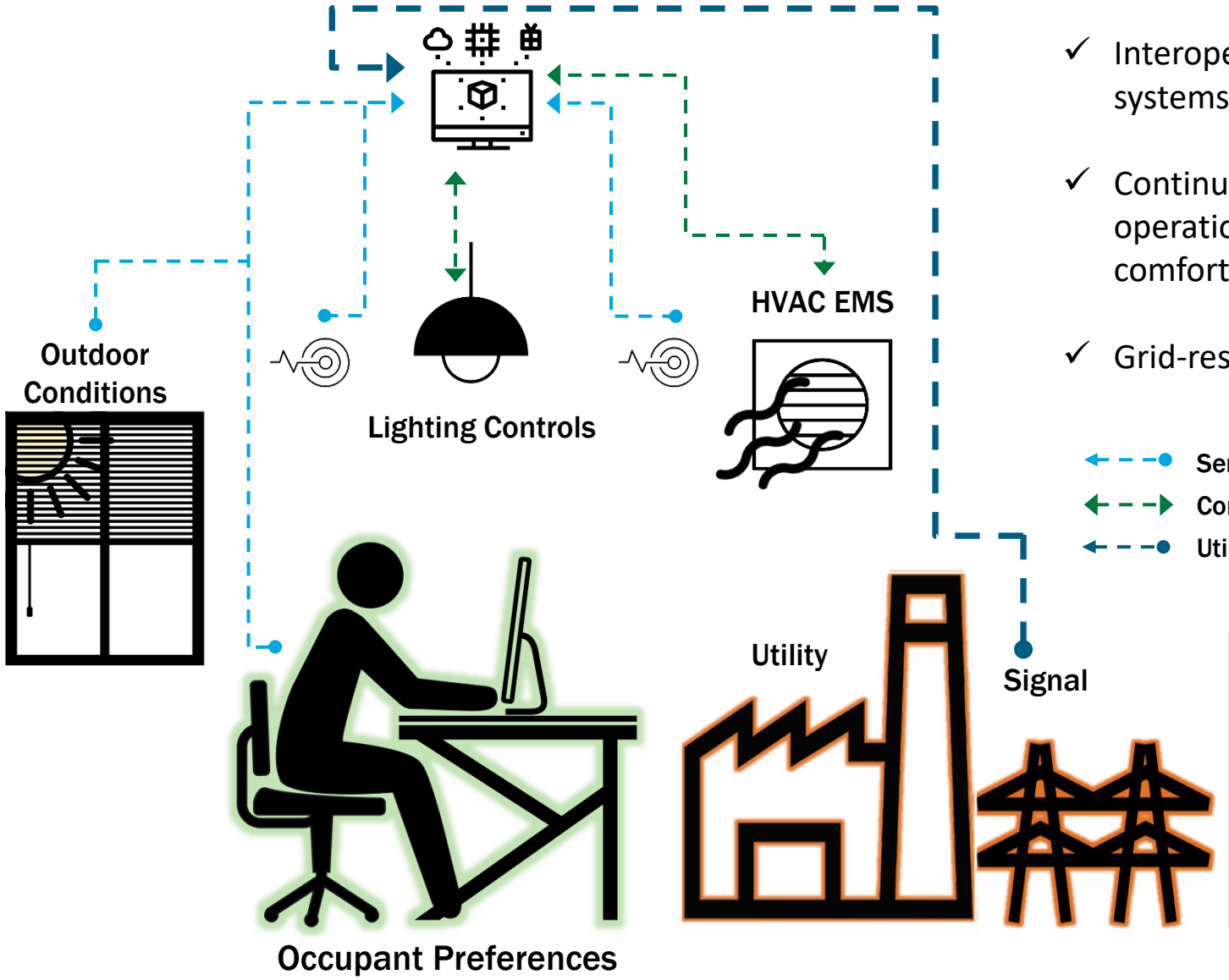
Assist in achieving **decarbonization** goals through reduced fossil fuel generation and increased heating electrification

Optimize energy use based on customer preferences

FLEXIBLE BUILDING LOADS CAN BENEFIT OWNERS, OCCUPANTS, THE GRID, U.S., EARTH

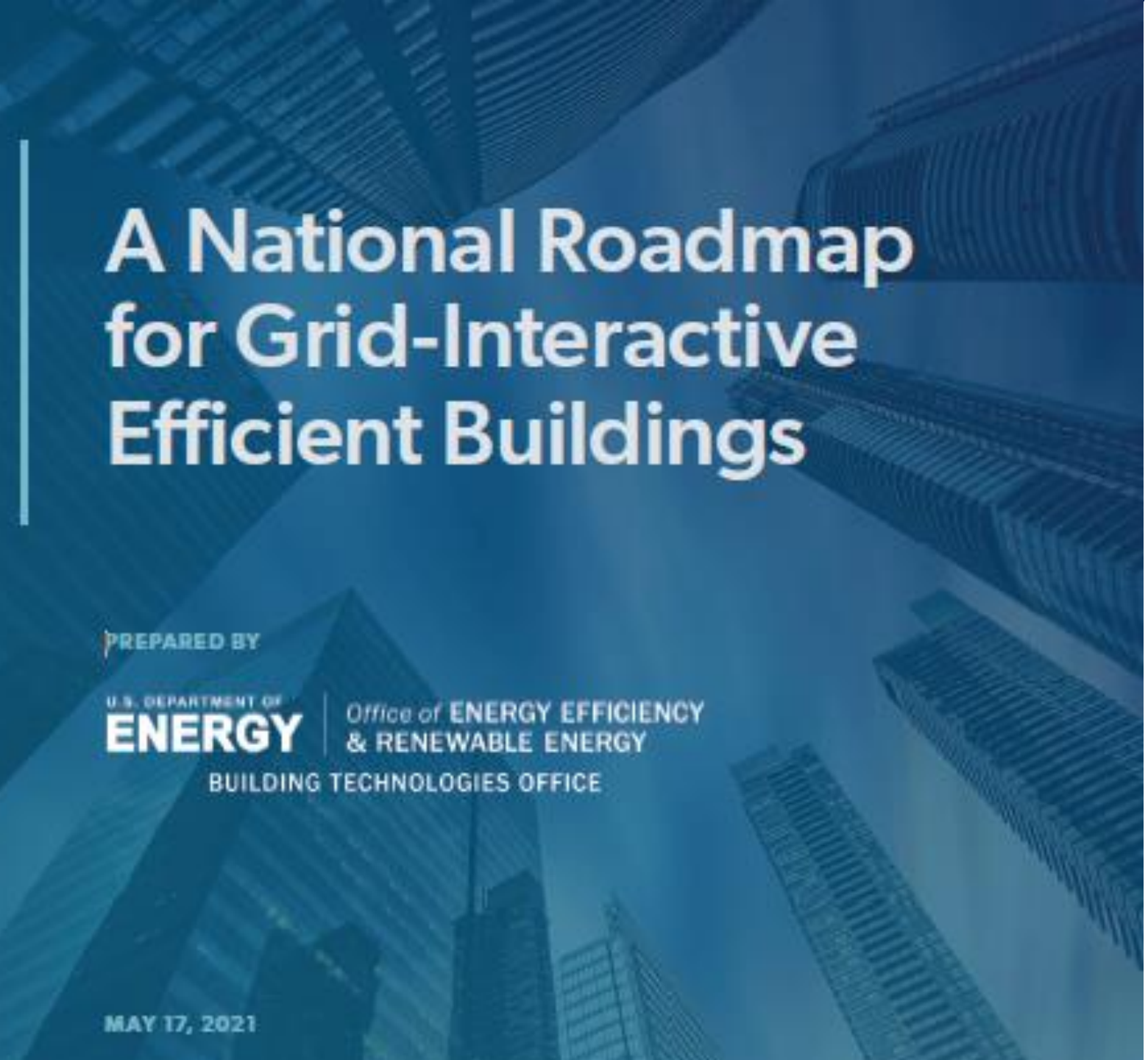
www.energy.gov/eere/buildings/GEB

GEBs: advancing demand flexibility and renewables generation



- ✓ Interoperable, integrated systems
- ✓ Continuously optimized operation for maximum comfort and efficiency
- ✓ Grid-responsive

energy.gov/eere/buildings/GEB



Recommendations organized by pillar

I. Advancing GEBs through **research and development**

II. **Enhancing the value** of demand flexibility to consumers

III. **Empowering GEB users** and operations

IV. Supporting demand flexibility deployment through state and federal **enabling programs and policies**

→ $100-$200(++?) Billion Opportunity

Groups of GEBs can provide added value: Connected Communities

Connected Community

Group of GEBs with diverse, flexible end use equipment that collectively work to maximize building and grid efficiency without compromising occupant needs and comfort.

Results from DOE's* first *Connected Communities* (a/k/a *Smart Neighborhoods*)

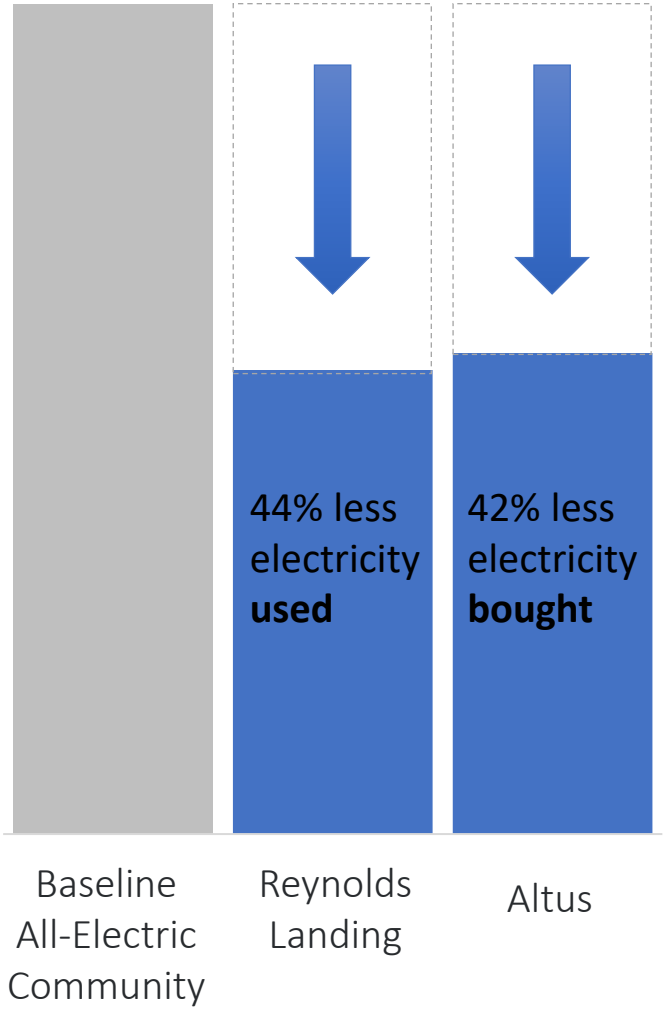
Reynolds Landing *(Hoover, AL)*

Alabama Power Smart Neighborhood® Idea Home. Image courtesy: Alabama Power.

- ✓ **7,167 kWh annual savings** per home on an equivalent sq. ft. basis
- ✓ **$931 annual savings** per home on an equivalent square foot basis
- ✓ **5.6 tons of CO_2 avoided per home**

* Partnership of Southern Comp., ORNL, EPRI, Homebuilders, Manufacturers, USDOE, others

Average Home Energy Use



Altus at the Quarter *(Atlanta, GA)*

Altus rooftop solar and batteries. Images courtesy: Georgia Power.

- ✓ **Homes sold an average 873 kWh** back to Georgia Power annually
- ✓ **In winter, 30% lower max hourly kW demand** than baseline
- ✓ **In summer, 62% lower max hourly kW demand** than baseline
- ✓ **9.3 tons of CO_2 avoided per home**

Connected Communities Projects to Take Many Forms

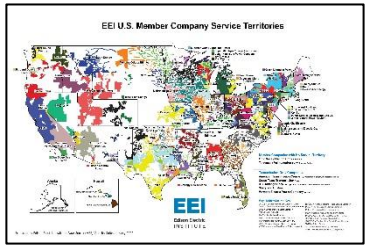
Residential neighborhoods

Mixed-use development

Commercial and multi-family buildings

University or corporate campus

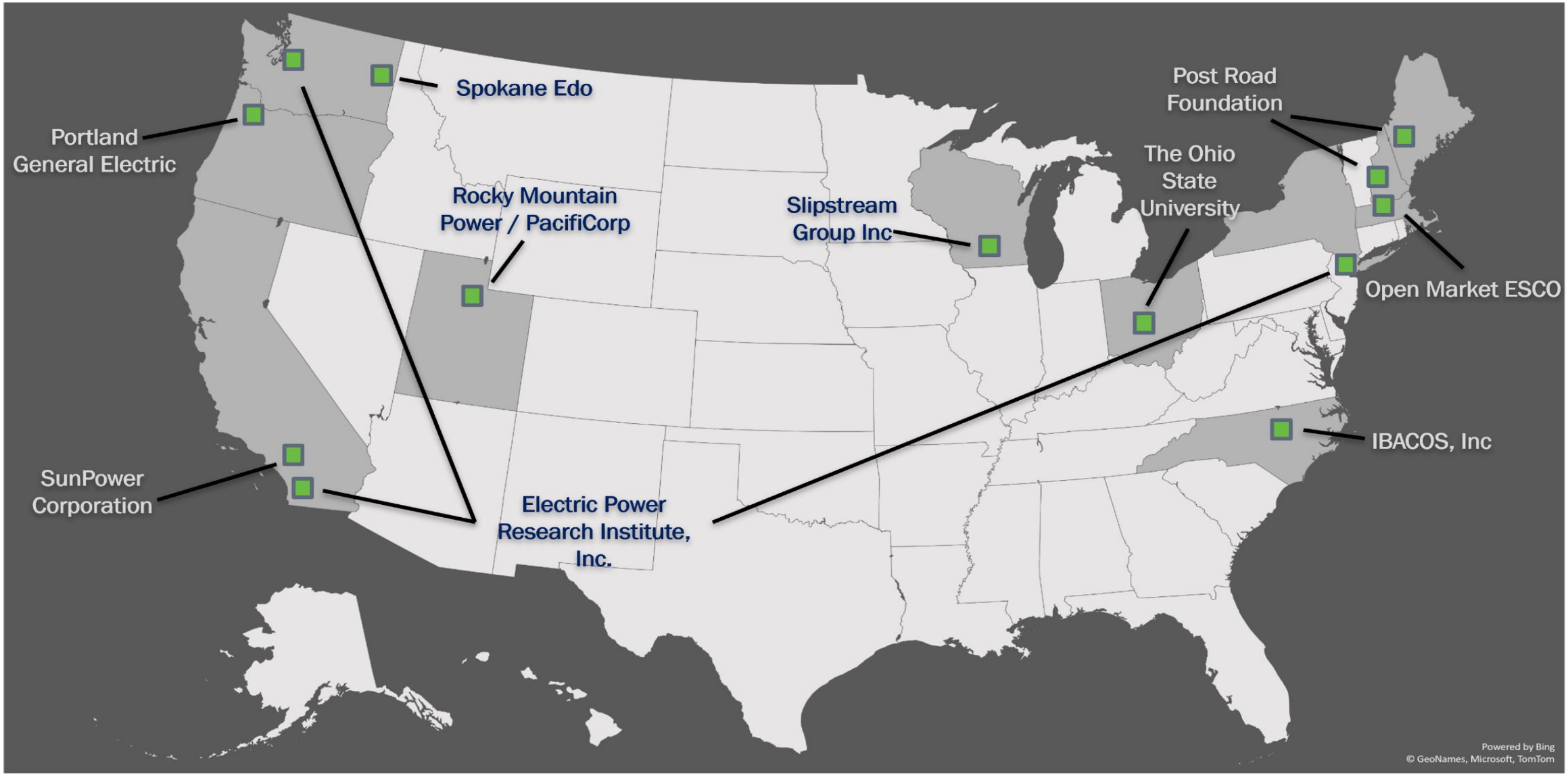
Geographically-dispersed building portfolio



Different geographies with varied utility and regulatory practices

New construction and existing building retrofits

DER integration: PV, battery storage, EV charging, CHP & district systems



[Press Release](#) | [Read More about the Selectees](#) | [ConnectedCommunities.lbl.gov](#)

Coordination Across a Diverse Cohort of Pilots

Activity Areas Beyond RD&D

- ✓ Building Energy Codes
  - Code values EE measures based on when savings occur
  - Compliance paths provide credit for DF measures
  - Code includes grid-interactive requirements and open standards for communication and automated load management
- ✓ Appliance and Equipment Standards
  - Equipment capable of automated load management in response to a signal
- ✓ Resource Standards
  - EE resource standards (EERS) include peak demand targets
  - States account for time-sensitive value of EE
  - DR included in EERS or eligible to meet clean energy standards
- ✓ Utility Programs
  - EE program goals include peak demand reduction
  - Cost-effectiveness assessments of EE programs consider time-sensitive value of savings
  - EE program metrics include carbon emissions
  - Requirements for DR programs include potential studies
  - DR goals include significant increases in peak demand savings over time
  - Programs for utility customers address equity
  - Pay for performance programs
  - Locational value informs incentive rates for EE and DR
  - Programs address multiple DERs to achieve DF
- ✓ What else?

Thank you – let's stay connected!

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BTO: www.energy.gov/eere/buildings

GEBsite: www.energy.gov/eere/buildings/GEB

GEB Roadmap: gebroadmap.lbl.gov

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See You Tomorrow

VAEEC 2021 Energy Efficiency Forum

1:30-4:00 pm

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