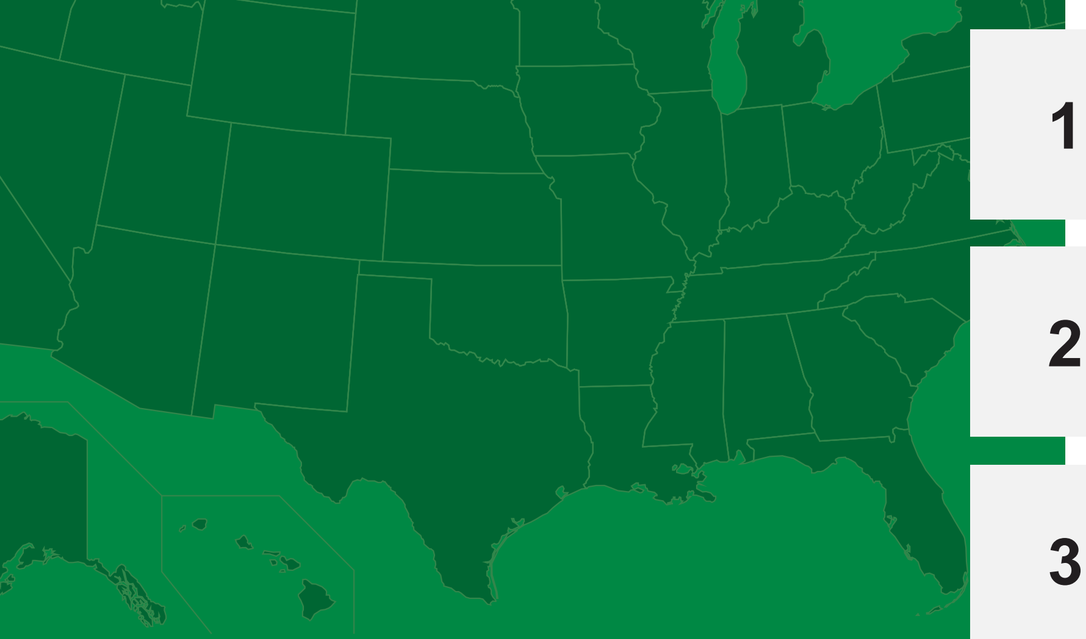
Community Resilience for all: *Utility Resiliency Action Plans With ESBs As Mobile Power Supplies*

Electric School Bus INITIATIVE

Moderators: Robert Stafford and Greggory Kresge

September 30, 2025

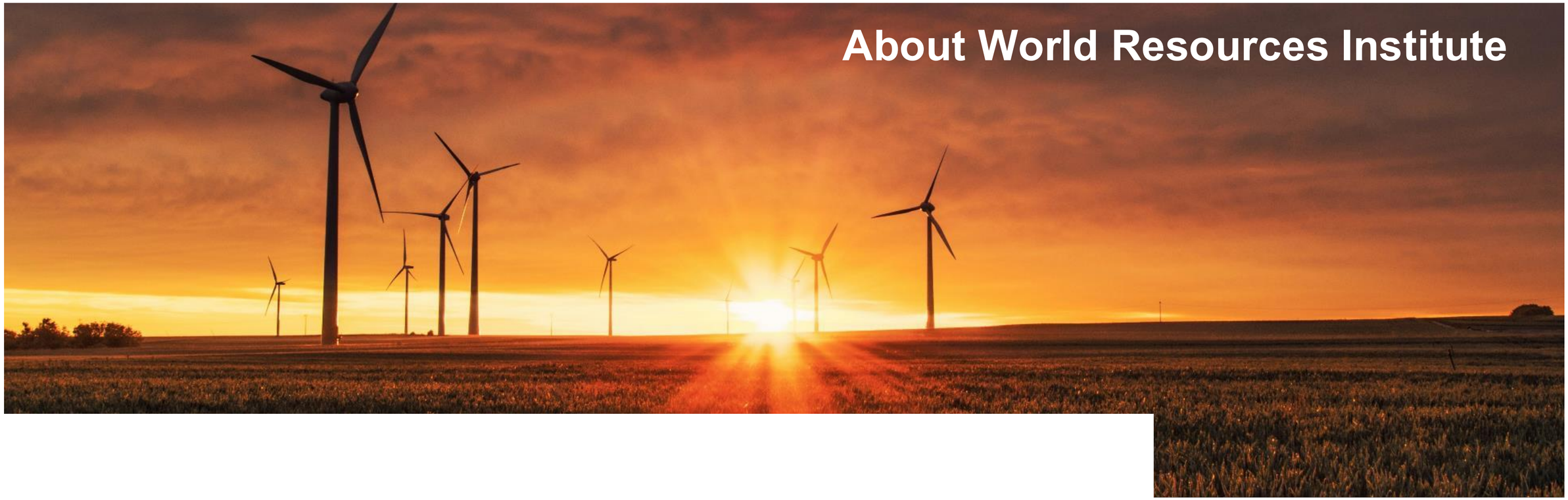


Meeting Logistics

1. Please rename your ZOOM title with your name and organization
2. Please put your questions in the chat box
3. Please participate in the surveys to help inform the topics and provide feedback on the value of the materials being presented
4. The meeting will be recorded and made available to all participants
5. We will try to address all questions not answered during the presentation at a later date
6. Poll questions will pop up in a separate window before the panel discussion. Please answer questions as they come up.

Agenda

Welcome (Logistics and Agenda)
About World Resources Institute and the Electric School Bus Initiative
Utility Working Group Recap and Next Steps
Pre-Panel Survey
Background on Utility Cohort and Rationale
Panel Discussion + Q&A Featuring Panelists: • Andrea Noel – Tennessee Valley Authority (TVA) • Gabby Abou-Zeid – Tucson Electric Power • Carol Kay & Sophie Tongsopit – Sacramento Municipal Utility District (SMUD) • Jordan Losiak – ComEd • Sam duPont – Baltimore Gas & Electric
Post-Panel Survey
Wrap-Up



About World Resources Institute

WRI is a global research organization working to improve people's lives, protect nature and halt climate change.

What do we do?

As an independent research organization, we leverage our data, expertise and global reach to influence policy and catalyze change across systems like food, land and water; energy; and cities. Our 2,000+ staff work on the ground in more than a dozen focus countries and with partners in over 50 nations.

Where do we work?

We have country offices in Brazil, China, Colombia, Democratic Republic of the Congo, Ethiopia, India, Indonesia, Kenya, Mexico, Rwanda and the United States, as well as regional offices in Africa and Europe.

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WRI'S ELECTRIC SCHOOL BUS INITIATIVE

Brief Overview

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20 MILLION

Students served by the U.S. school bus fleet every day

480,000

Total vehicles in the U.S. school bus fleet

7 BILLION

Combined trips taken by vehicles in the U.S. school bus fleet each year

Converting these buses to electric ensures **a healthy ride for children, drivers and communities**, while also providing climate benefits and building grid resiliency.

Sources: School Bus Fleet, NHTS

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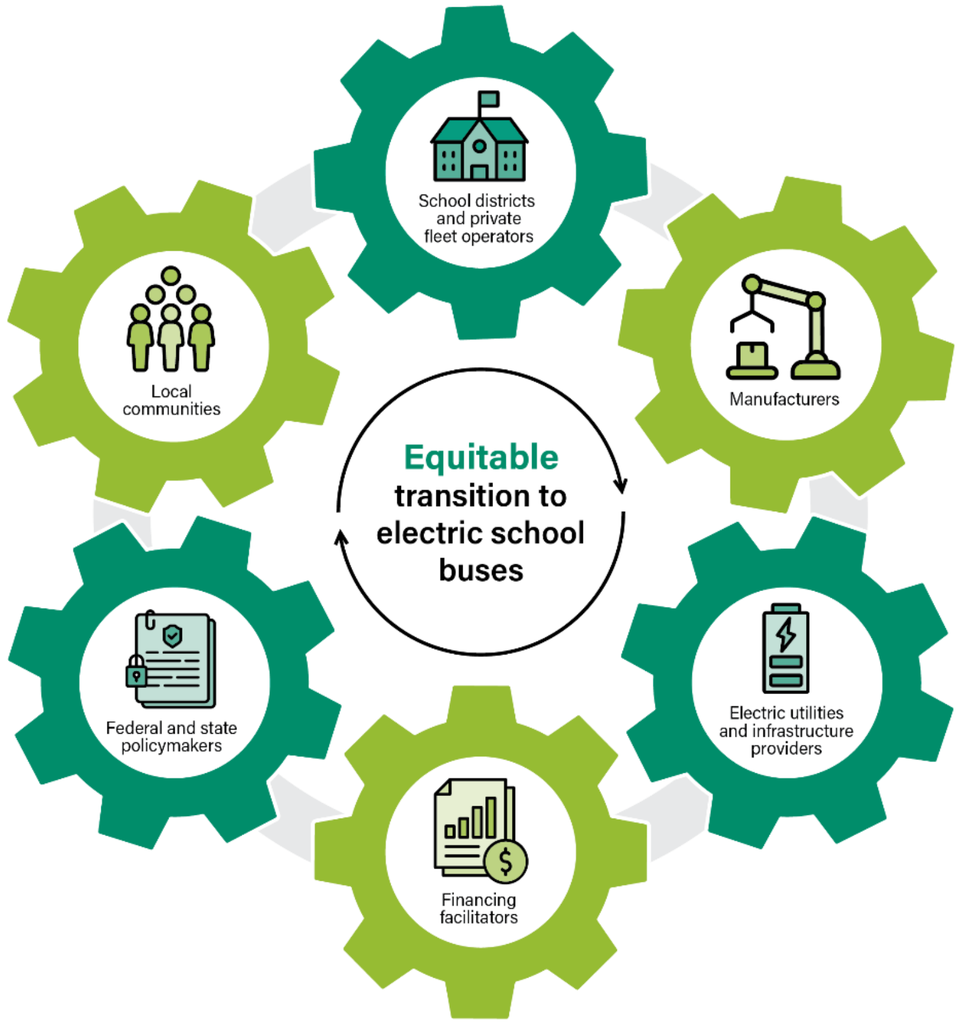
Our aim: Electrify entire U.S. school bus fleet

- Partner with communities, school districts, industry experts, manufacturers, utilities, and policy makers to transform and electrify the school bus market
- Together, build unstoppable momentum to electrify 480,000 school buses in the U.S.
- Ensure an equitable transition by focusing on underserved communities

SYSTEMS CHANGE ACROSS MULTIPLE STAKEHOLDERS



Our Theory of Change

By partnering with school districts, manufacturers, utilities, policymakers, regulators and communities, we can increase knowledge and support for an equitable electric school bus transition.

NOTES AND SOURCE go here

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Utility Working Group Highlights

- **10 Meetings** focusing on the intersection of electric utilities and equity.
- **Support, influence and drive** the development and implementation of successful electric school bus supportive programs, rates, models and other mechanisms.
- The culmination of this working group is captured on our Utility Working Group Webpage where you will find summaries of the meetings along with presentation materials and presenter lists.

Where We've Been and Where We are Going

Topics Covered:

- ESB business models
- Power planning
- Distribution system examples
- Microgrid applicability for underserved communities
- Resiliency through vehicle-to-everything (V2X) technologies
- Potential roles of ESBs in emergency response
- Equity frameworks
- Load forecast planning tools
- Proactive site investments Tribal energy access
- Automated load management
- Flexible connections
- Energy storage
- Site energy efficiency improvements
- Successful use of Mutual Aid Agreements

As we look to the future, we will be sending out a survey to our utility working group members to investigate new topics for discussion…stay tuned!

Survey Questions Pre-Panel

ESB Utility Resiliency Action Planning Process

Why -
Utilities are key responders in emergencies to restore power safely. Enabling community resiliency during grid outages ensures planned facilities can provide safe power supplies to the people who need it the most while providing crucial time for utilities to focus on safe power restoration for all.

What - gathering a geographically diverse group of UWG member utilities to plan for utilizing deployed ESBs for resiliency purposes and plan for future uses. Convene monthly group meetings, with individual meetings between WRI and utilities towards end of cohort to finalize plans.

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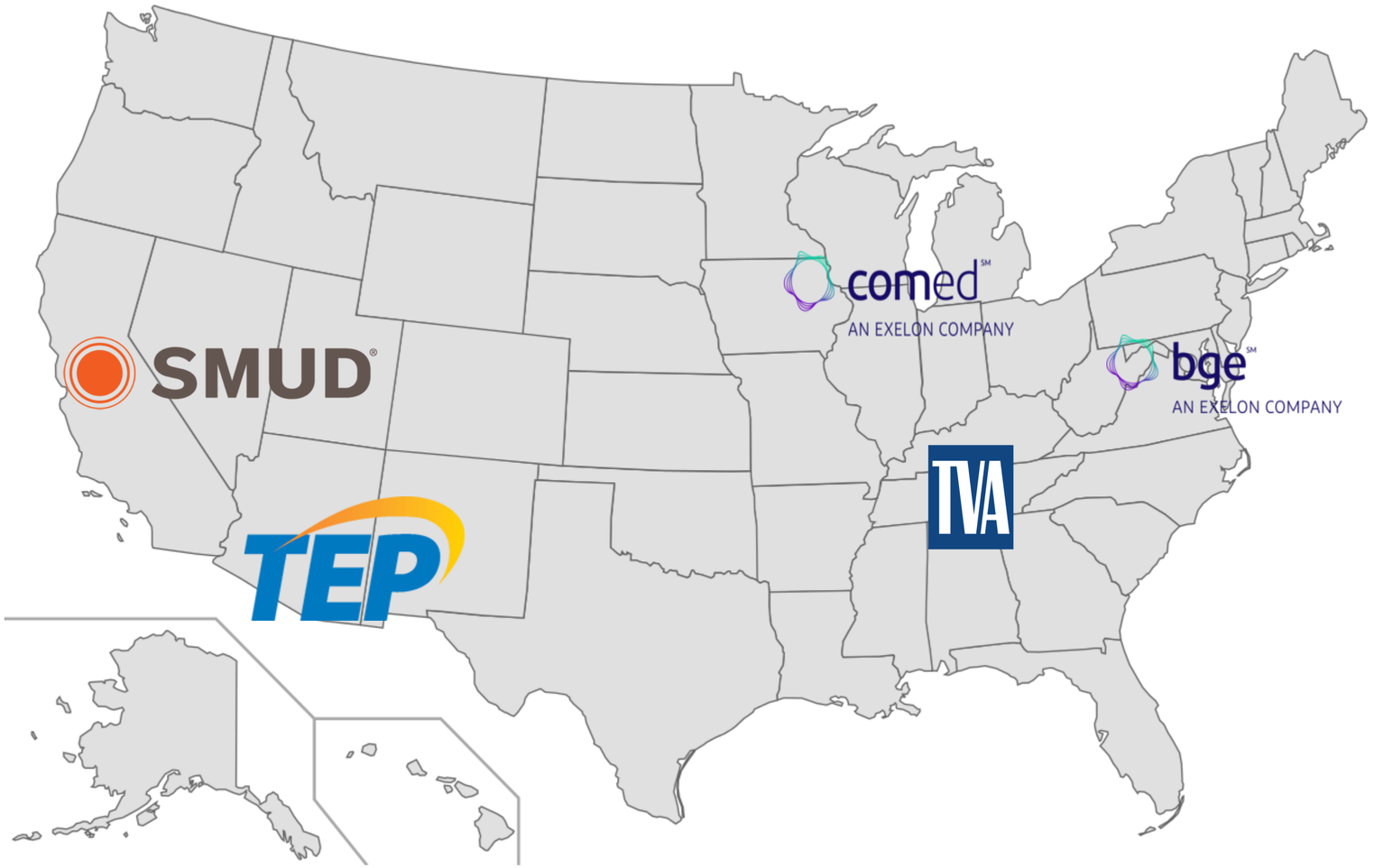

Participating Utilities

- Sacramento Municipal Utility District (SMUD)
- Tucson Electric Power (TEP)
- ComEd
- Tennessee Valley Authority (TVA)
- Baltimore Gas & Electric (BGE)

Process & Lessons Learned

Base Plan – LBNL Grid Resilience Plan

Process –

- Executive sponsorship
- Partnering with community organizations
- Identifying local risks
- Planning applications for ESBs
- Involving ESB operators

Lessons learned –

- ESB applications are still new but available
- Different needs in different areas
- Community conversation is a must
- Learn and iterate

Community Outreach

- Identifying community organizations (e.g., Napa Valley Community Organizations Active in Disaster (COAD))

- Conducting outreach - Community Org Outreach Template

Source: Crippa et al. 2021, WRI World Resources; Report 2019, Xu et al. 2021; Photo: Electric School Bus Initiative

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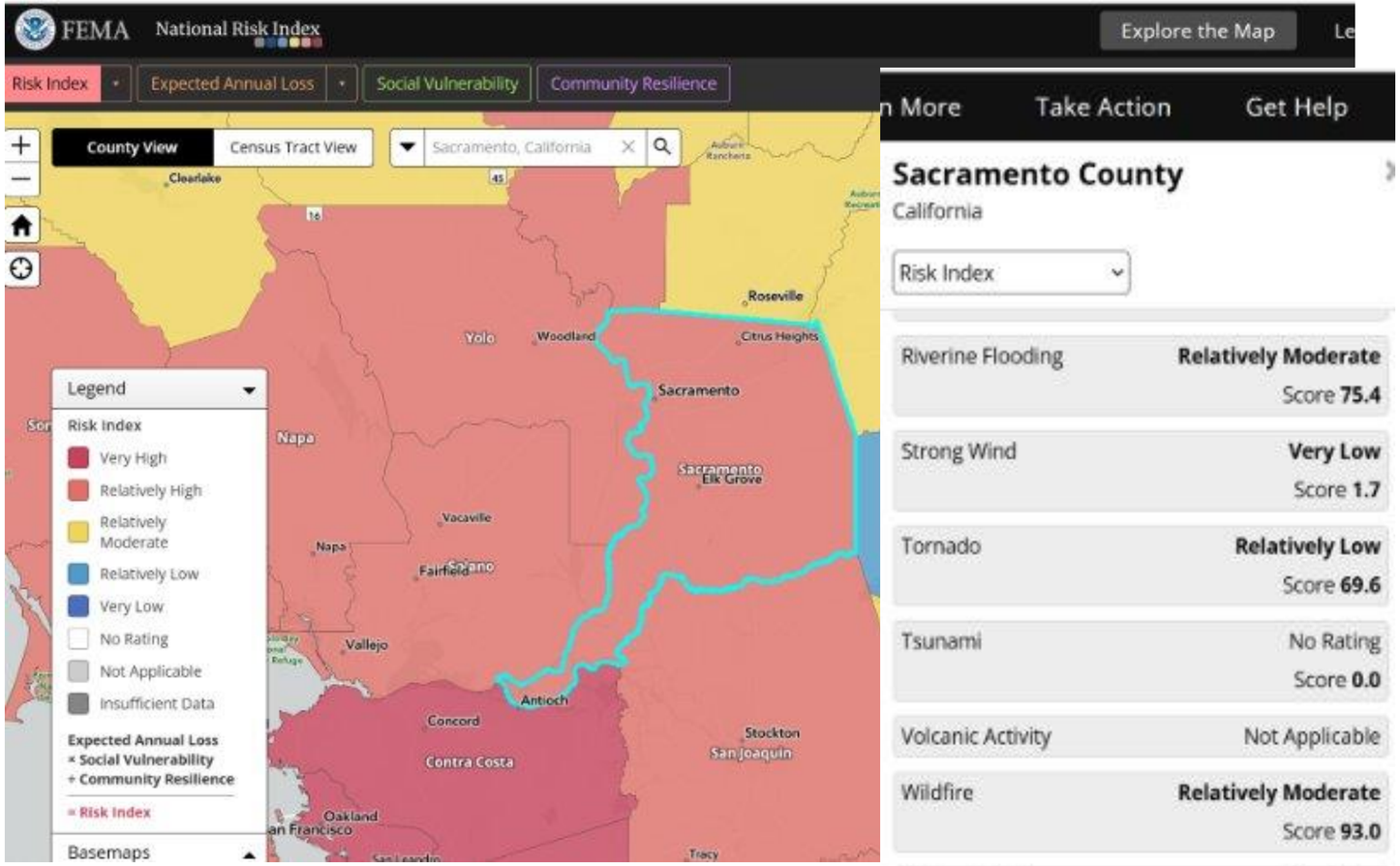


n More | Take Action | Get Help

Sacramento County

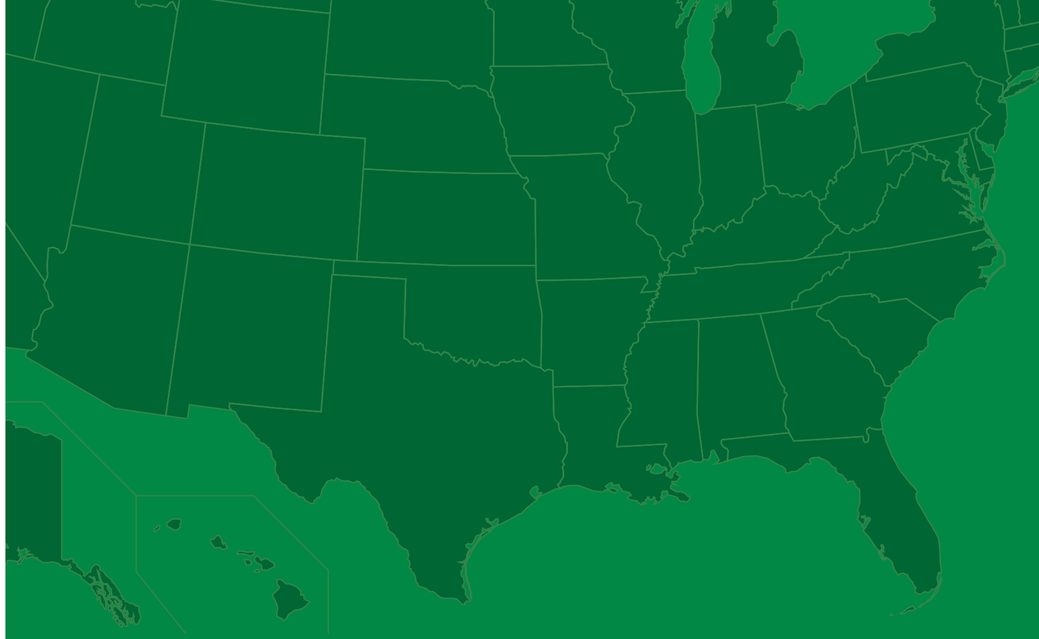
California

Risk Index

Riverine Flooding	**Relatively Moderate** Score **75.4**
Strong Wind	**Very Low** Score **1.7**
Tornado	**Relatively Low** Score **69.6**
Tsunami	No Rating Score **0.0**
Volcanic Activity	Not Applicable
Wildfire	**Relatively Moderate** Score **93.0**
Winter Weather	**Very Low** Score **11.5**

Calculating the Risk Index

Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and



Risk Assessment

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Planning for the Future

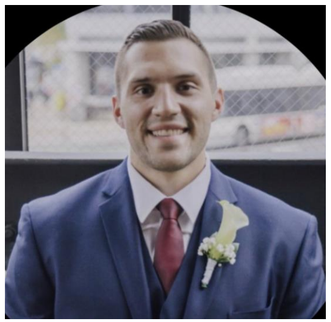
- Capitalizing on current deployments
- Creating frameworks for future uses
- Working with ESB operators - V2X Implementation Guide and Mutual Aid Agreement Template

Source: Crippa et al. 2021, WRI World Resources; Report 2019, Xu et al. 2021; Photo: Electric School Bus Initiative

Andrea Noel – TVA,
Program Manager,
Power Supply & Fuels

Gabby Abou-Zeid – TEP,
Program Manager,
Transportation Electrification

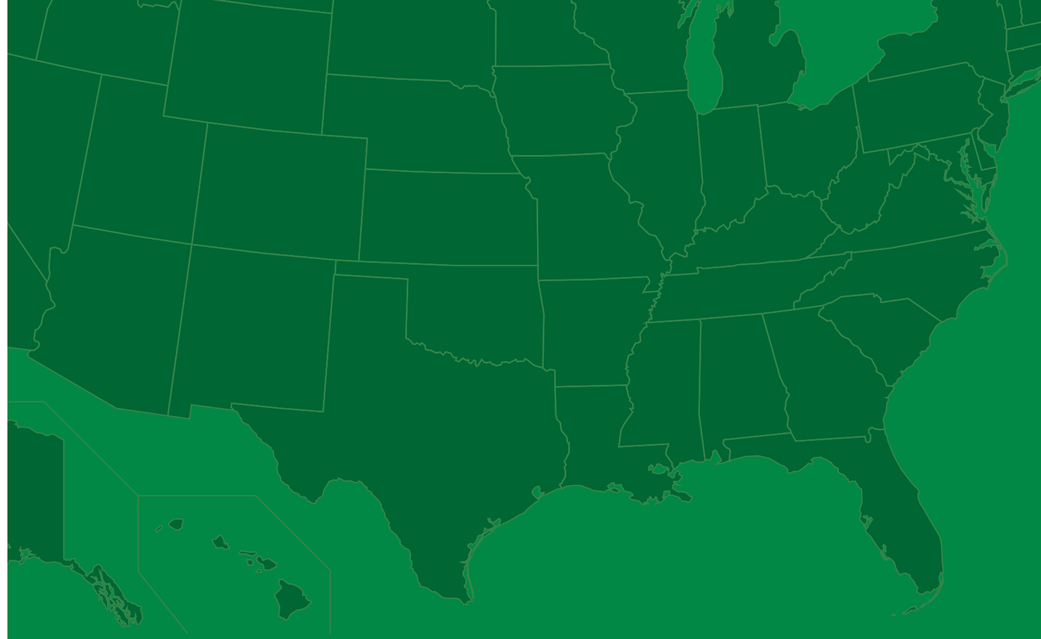
Sam duPont – BGE,
Principal Business Program Manager,
Transportation Electrification



Jordan Losiak – ComEd,
Sr. Business Program Manager,
Beneficial Electrification

Carol Kay – SMUD,
Project Manager,
Research & Development

Sophie Tongsopit – SMUD,
Senior Strategic Business Planner,
Zero Carbon Energy Solutions



Utility Presentations

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ESB Utility Resiliency Cohort – Tennessee Valley Authority (TVA)

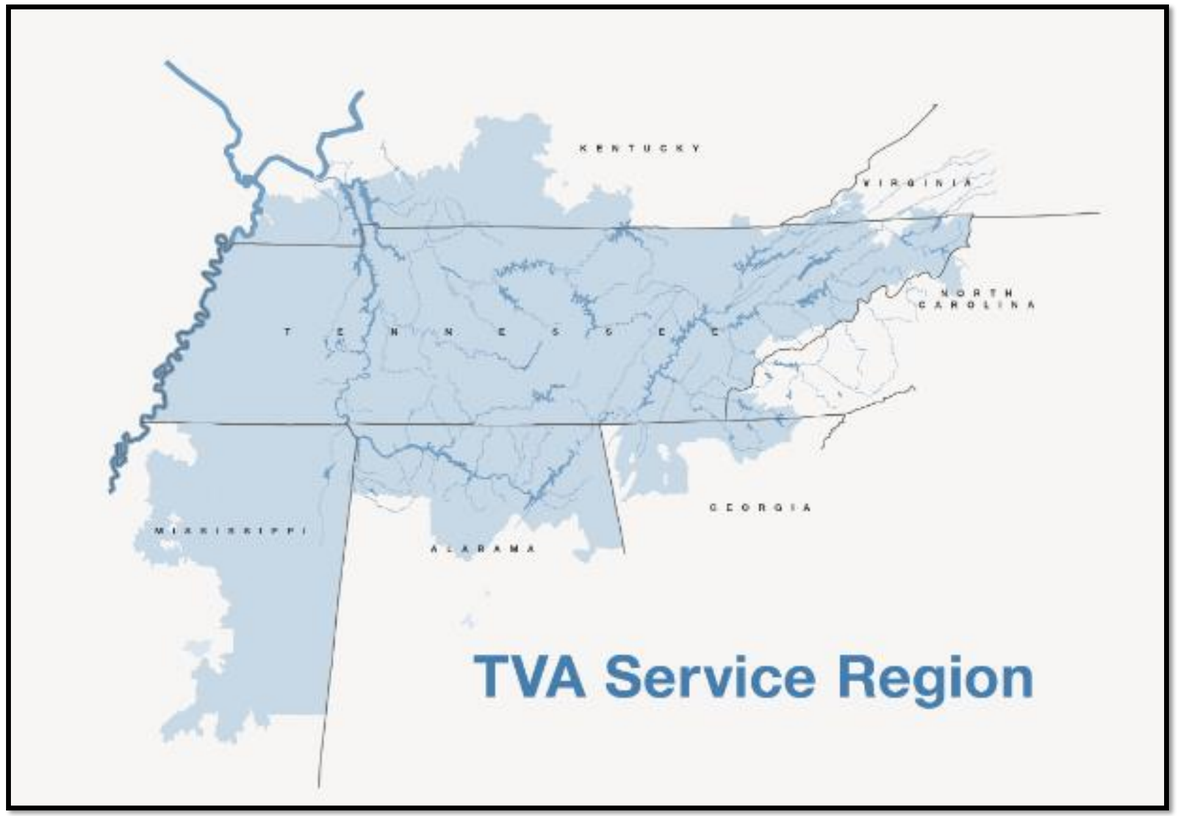
September Utility Working Group Meeting

Andrea Noel, Program Manager – Distributed Solutions

9/30/2025

Tennessee Valley Authority (TVA)

- TVA, a federally owned corporation, was established in 1933 via the Tennessee Valley Authority Act and with the purpose of improving life in the Tennessee Valley
- TVA supplies power across **7** Southeastern states which includes; most of **Tennessee**, northern **Alabama,** northeastern **Mississippi**, and southwestern **Kentucky**, and in portions of northern **Georgia**, western **North Carolina**, and southwestern **Virginia**
- Partnering with 153 local power companies to supply electricity to approximately 10 million people.
- Total of 211 ESB's in-service or committed
  - 166 ESBs on road in 26 counties
  - 45 ESB's still coming to the Valley



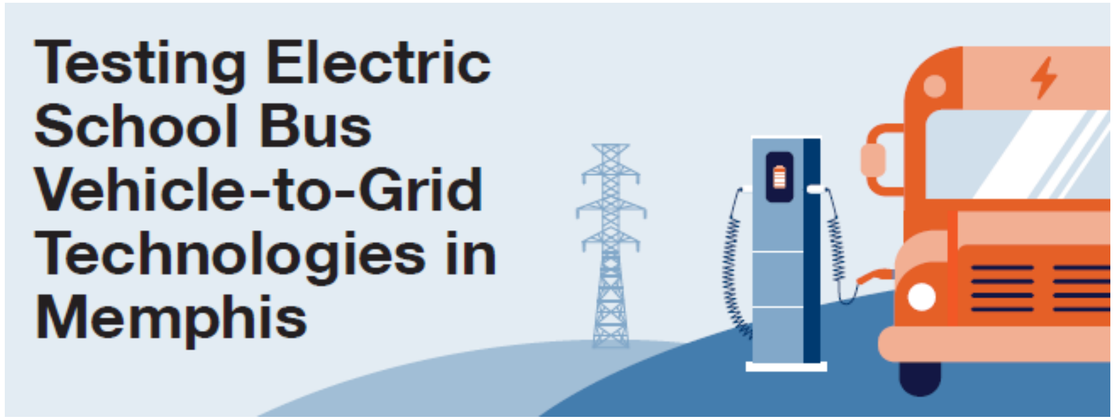
Activities During Cohort

- Discussions with executive/leadership
  - Director of Innovation & Research
  - Manager of resilience program
  - Generally supportive, need to tailor to our situation
- Local risks/potential emergencies
  - Severe Weather Events (Flooding poses the highest risk followed by tornados, thunderstorms & lightning, extreme temperatures)
- Community organizations
  - Emergency Management Agencies in each state, preparedness planning

Rising waters crest over a chain-link fence, turning the area around Mountain Electric Cooperative's headquarters into a small lake. (Photo Courtesy: Mountain Electric Cooperative)

Looking Forward

- Plans/hopes for using ESBs for resiliency purposes
  - V2G pilot underway to evaluate ESB's potential to provide backup power to schools, communities, and the grid in the event of power outages.
- Plans for outreach to community orgs
  - TVA will share results from the pilot with LPC and ESB school districts.
- Where documents will live in your org
  - Documents will live on our SharePoint with the Distributed Solutions team. Once they are more developed and outcomes from the pilot project incorporated, they could be housed on our ESB page.
- Learnings from cohort process and advice for any other utilities
  - Utilities are vastly different, at different stages of school bus electrification, and facing different challenges and hazards.
  - Start planning early



Project Goal	Partners
Evaluate the technical and financial feasibility of bi-directional charging as a scalable and sustainable grid resource.	- TVA - Memphis Light, Gas, and Water (MLGW) - First Student - Electric Power Research Institute (EPRI)

ESB Utility Resiliency Cohort – Tucson Electric Power

America Miranda
Gabriella Abou-Zeid
9/30/2025
September Utility Working Group Meeting

Tucson Electric Power (TEP)

- Arizona: Tucson Metro Area
- 452,000 Customers served
- # of ESBs on road: 11 soon!
  - Buses will participate with us in a vehicle to grid (V2G) pilot. Testing to occur this year with full seasons in 2025/2026.

Cohort Activities

Organizational support for ESB efforts around V2G. More discussions to be had around broader use cases.

Local risks/potential emergencies

- Prolonged extreme heat
- Monsoon flooding
- High winds
- Wildfires
- Supply chain disruptions

Community organizations –

- Schools: Sunnyside Unified School District, Tanque Verde Unified School District, Tucson Unified School District
- Nonprofits – Nonprofit EV Transportation Pilot
- Municipalities

What's Next?

Plans/hopes for using ESBs for resiliency purposes:

Our hope is to utilize ESBs as mobile backup power sources for critical community infrastructure such as schools, cooling centers or shelters. This can provide flexible storage options during monsoon outages (for backup), extreme heat scenarios (load shed), and supporting renewables (absorbing excess solar)

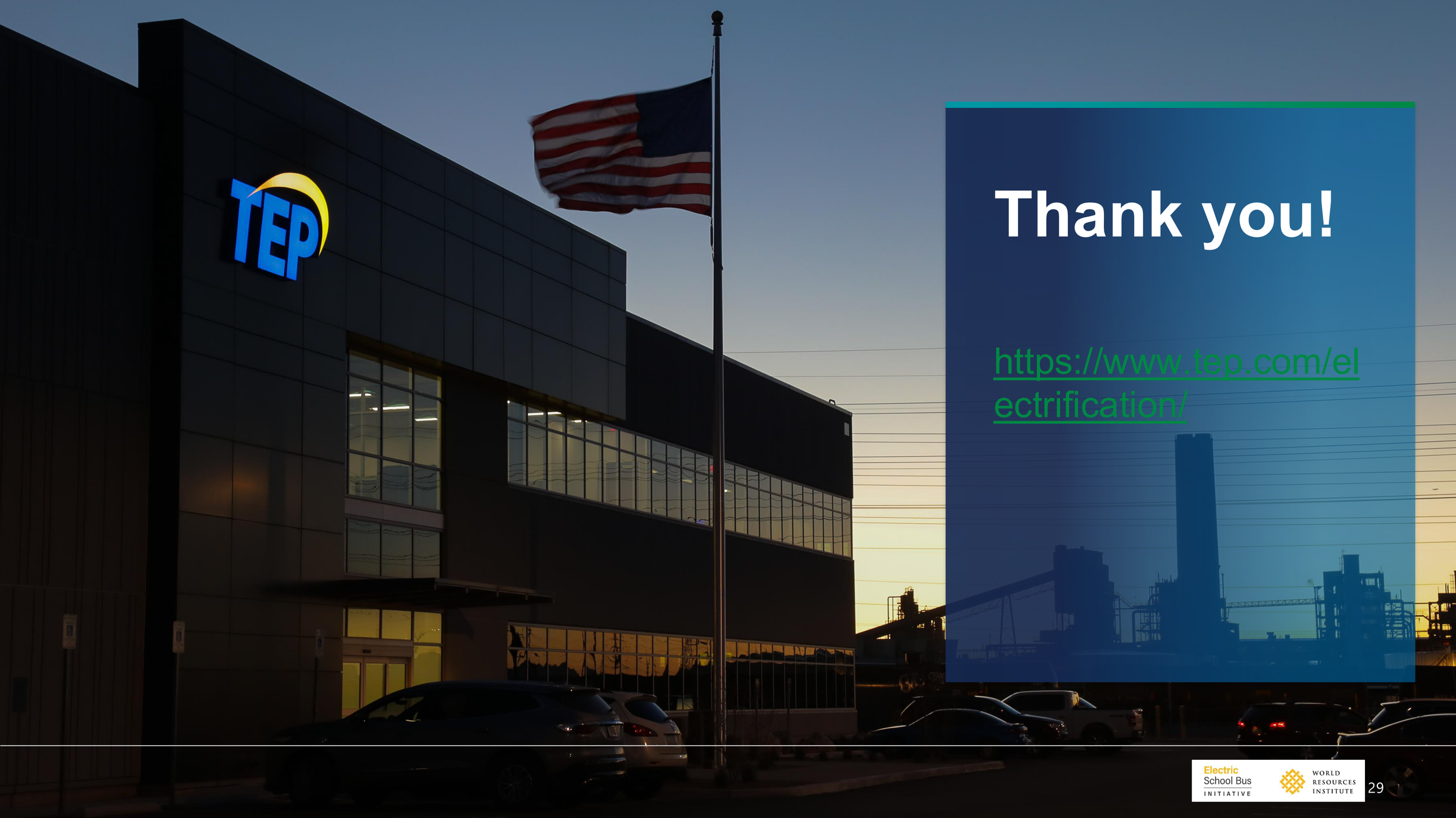
Plans for outreach to community orgs

Primary collaborators – schools and municipalities most engaged in this work right now, with impact flowing down to community. Potential for work with nonprofits depending on program structure.

- Additional orgs identified through cohort: SARSEF, Tucson Refugee Ministry, United Way

Where documents will live in your org: SharePoint, within our team

Learnings from cohort process and advice for any other utilities: Early stakeholder engagement is important – both internal and external. Build internal ownership of resiliency plans. Be transparent and inclusive when working with underserved communities – go out and assess their needs.



Thank you!

https://www.tep.com/electrification/

ESB Utility Resiliency Cohort – Sacramento Municipal Utility District (SMUD)

September Utility Working Group Meeting

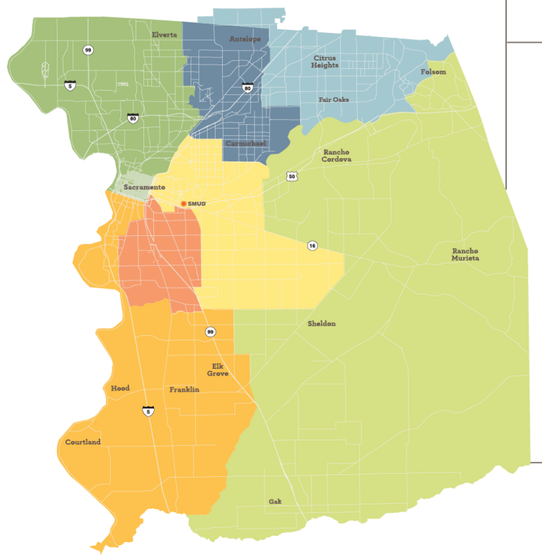
Sophie Tongsopit
Carol Kay

9/30/2025

Sacramento Municipal Utility District

SMUD is your community-owned, not-for-profit electric service.

6th largest community-owned **in the U.S.**



75+ Years

Est. 1946

2023 Power mix about **78%*** **carbon-free**

100% Zero carbon by 2030

The most ambitious goal of any large utility in the United States

~645,000 Customers

~2,300 Employees

7 member Elected Board of Directors

SMUD's rates are among the lowest in California,
and on average more than **50% lower** than those of neighboring PG&E.

ESB Landscape

- **SMUD serves 13 school districts**
  - All districts with buses have at least one ESB
  - Three bus yards in disadvantaged communities
  - Adoption ranges from one to 84
  - Total of 179 committed (on the road or ordered) ESB
  - Total opportunity > 600 ICE school buses
  - One district is designing a resiliency center – ESB opportunity

- **Existing ESB/Transportation Electrification**
  - Efforts to stand up VGI with two districts & one ESB vendor in 2025-2026
  - Incentives available for EV chargers
  - Complementary Fleet Advisory Service available

Activities During Cohort

- **Opportunity socialized among several departments**
  - Research & Development
  - Distributed Energy Strategy
  - Risk Management
  - Business Continuity
  - Sustainable Communities

- **Top hazards for infrastructure and community**
  - Wildfires
  - Local flooding
  - Extreme heat
  - High winds/severe storms
  - Cybersecurity

Activities - Community Organizations

- Worked with SMUD's Sustainable Communities group to identify potential partners.
- From a list of ~200 active partners, narrowed down to four partners shown below.

Community Outreach			
Name	**Brief description**	**Level of Interest**	**Use Cases**
Sacramento Food Bank and Family Services	The largest hunger relief food bank in Sacramento County, serving an average of 300K neighbors every month.	**High**	• Backup power for refrigeration • Avoid diesel generators
La Familia Counseling Center	Provides multicultural counseling, outreach, and support services to low-income, at-risk youths in Sacramento County	**High**	• Backup power for community center and kitchen • Available space to host community members during prolonged outages
Mutual Housing	Develops and owns affordable multifamily complexes in Sacramento County	**High**	• Backup power for community rooms • Opportunity to use existing solar projects for charging
Greater Sacramento Urban League	Empowers black and historically marginalized communities to secure economic self-reliance through training, career counseling, education, and policy advocacy.	**Medium**	• Backup power for the Grand Gathering Space, which includes a flexible plaza for entrepreneurial activities. .

Looking Forward

- Plans/hopes for using ESBs for resiliency purposes –
  - ✓ School-Hosted Community Resiliency Center Pilots: using ESB as an alternative to backup diesel generators; siting in low-income/DAC areas
  - ✓ Ideation of a new Community Solar Plus Storage program.
- Plans for outreach to community orgs
  - ✓ Coordinate with the Sustainable Communities group and share the findings so far and gauge organizational interest and resources to pursue this further.
    - ➢ Site identification
    - ➢ Understanding use cases
    - ➢ Sizing of solar, stationary storage, and mobile storage
- Where documents will live in your org
  - Documents will live in SharePoint under the EPEC (Emergency Preparedness & Enterprise Continuity) site

Learnings

- **Recommendations**
  - Locations close to bus yards
  - CBOs with space to host solar and EV chargers
  - CBOs in LI/DAC communities, which can serve communities that are most vulnerable to health hazards during extreme weather events
  - Socialize with parts of the organization responsible for community outreach
  - Consider incorporating bidirectional chargers during new construction (easier with AC V2G)
  - Involve Government Affairs

- **Hurdles**
  - Limited opportunities due to currently available technology
  - Identifying resources to drive buses

ESB Utility Resiliency Cohort – ComEd

September Utility Working Group Meeting

Jordan Losiak

9/30/2025

About Commonwealth Edison

Commonwealth Edison (“COMED”)

- Serves nearly 4 million electric customers across northern Illinois, including the city of Chicago.
- Powers homes and businesses through an extensive transmission and distribution system spanning 11,400 square miles, with over 90,000 miles of power lines
- Has an estimated 669 Electric School Buses (“ESBs”) on the road
- Supports school bus electrification through its Beneficial Electrification plans which provide incentives for ESB purchases and repowers, along with Make-ready incentives for Charging infrastructure.

Activities During Cohort

- Discussions held with Cristina Botero Senior Manager of ComEd's Beneficial Electrification Program. Regarding implementation of ESB in emergency scenarios
  - Resiliency capabilities of ESBs -
  - V2g -
  - Identification of ESB -
- Information and suggestions provided by WRI was well received in the matter of identifying where ESBs are in northern IL and how we can further support rollout when in need.

- Critical Risks Identified:
  - Local risks/potential emergencies – Wind/Ice and Temperature posed as our biggest threats.
- Community / organization partners supporting ESBs:
  - Illinois Clean School Bus Coalition, Midwest Clean Diesel Initiative and The Municipal Mayor Caucus.

Looking Forward

- **Expand plans, for the use of ESBs**
  - Identify and map where ESB resources reside along with charging infrastructure.
  - Continue to pilot V2G technologies in our BE Plan 2 running 2026-2028.
  - Continue our outreach to and develop partnerships with community organizations
  - Map locations of ESB within ComEd's service territory
  - Continue to offer rebates for both ESB and Make Ready Infrastructure.
  - We will externally share mapping of ESBs and ensure our internal Team's are aware of work conducted and learned within WRI's Cohort.
  - Identify assets in the field that are key to ensuring customers are educated and aware that ESB resiliency can lead to additional conversion to ESBs

ESB Utility Resiliency Cohort – Baltimore Gas and Electric

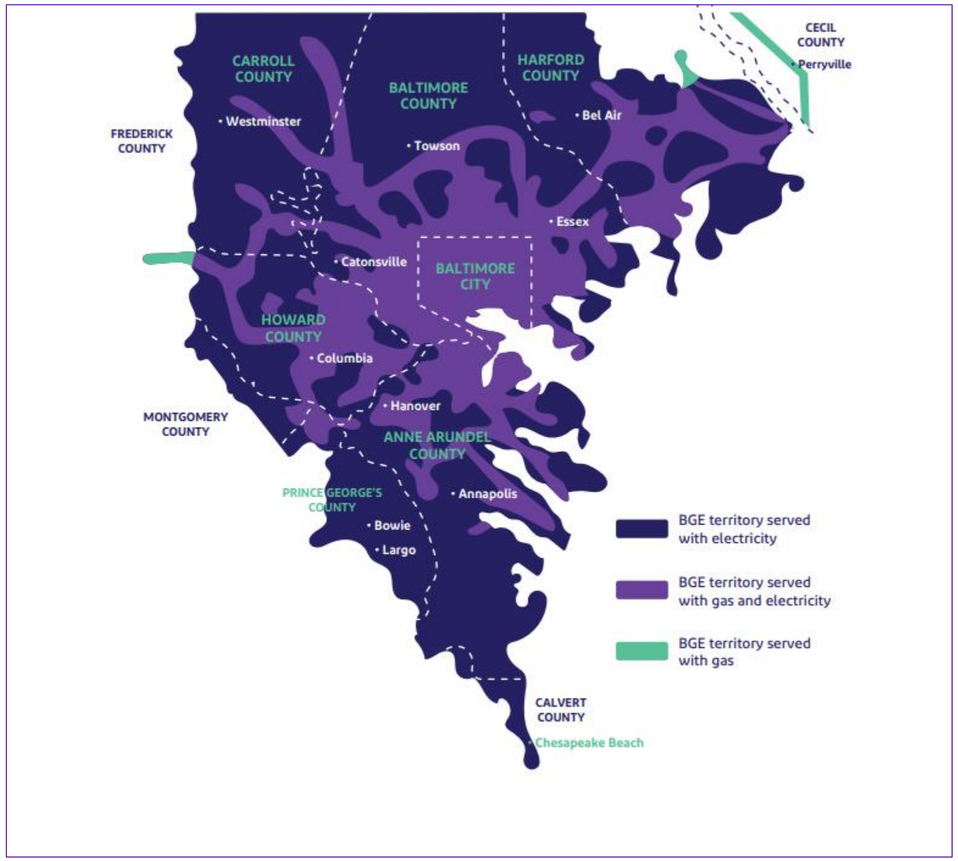
September Utility Working Group Meeting

Samuel C. duPont
BGE Transportation Electrification - Commercial

9/30/2025

bge℠
AN EXELON COMPANY

- **Service Area – Central Maryland:**
  - Electric by Area: 2,300 square miles
  - Gas by Area: 800 square miles
- **Customer Count:**
  - 1.3 million electric
  - 700,000 natural gas
- **Employees:**
  - approx. 3,200
- **Substations:**
  - 244, plus 92 company owned on customer property
- **Distribution & Transmission Power Lines:**
  - 26,600 circuit miles distribution
  - 1,300 circuit miles transmission
- **Natural Gas Pipeline Network:**
  - 7,600 miles
- **# of ESBs on road:**
  - 30



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Activities During Cohort

- Discussions with executive/leadership
  - VP Strategy
  - Director Clean Energy Solutions
- Local risks/potential emergencies
  - High-intensity, somewhat frequent, small size Spring/Summer storms
  - High-intensity, infrequent, large Summer/Fall Hurricanes
  - Winter ice/snow
  - Tidal flooding
  - Vegetation issues due to the above
- Community organizations
  - Local nonprofit / religious institutions
  - Airport
  - University
  - Municipal Emergency Management

Looking Forward

- Plans/hopes for using ESBs for resiliency purposes
  - No concrete plans yet
    - External to BGE: integrating school system/ESB operators plans with municipal emergency management and/or large MUD operators to power common area buildings / resiliency centers during emergencies
- Plans for outreach to community orgs
  - Pending depending on regulatory activity
- Where documents will live in your org
  - Strategy and Regulatory Affairs division, Clean Energy Solutions department (responsible for reg affairs and program management)
- Learnings from cohort process and advice for any other utilities
  - Codify ideas and plans – even if early-stage
  - Keep an open mind for opportunities, especially given the current market, regulatory, and political dynamics

Survey Questions Post-Panel

Discussion and Q&A

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Thank You.

Scan the QR code below to visit our website and learn more → electricschoolbusinitiative.org

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