DOE-OE Energy Storage Technology Advancement Partnership (ESTAP) Webinar

Energy Storage for Social Equity (ES4SE): An Introduction to the DOE-OE Initiative

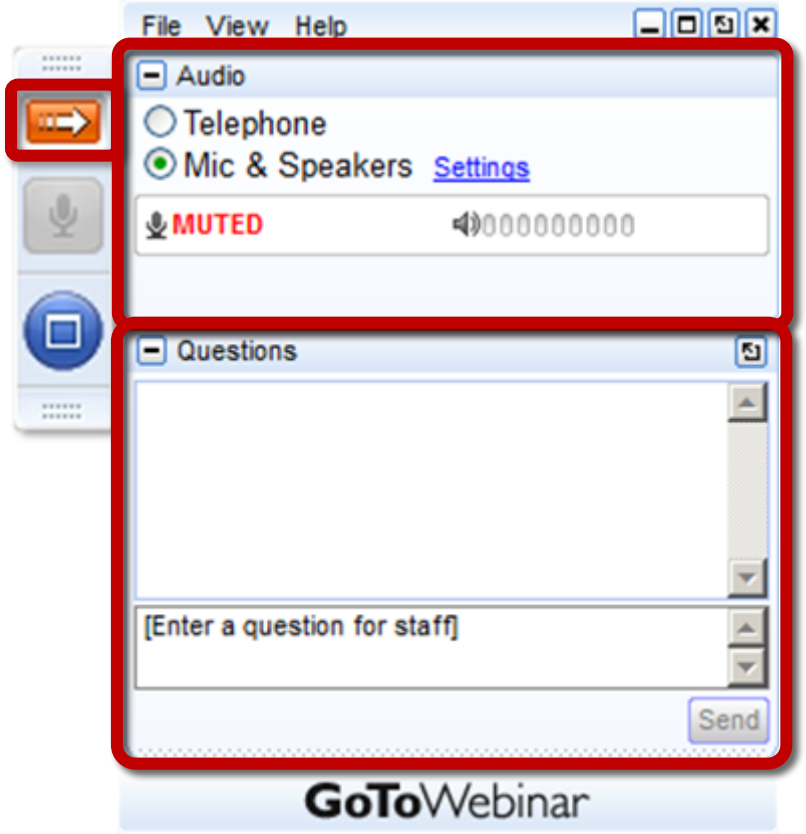
November 1, 2021

U.S. DEPARTMENT OF ENERGY

Sandia National Laboratories

CleanEnergy States Alliance

Webinar Logistics



Join audio:

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Submit questions and comments via the Questions panel

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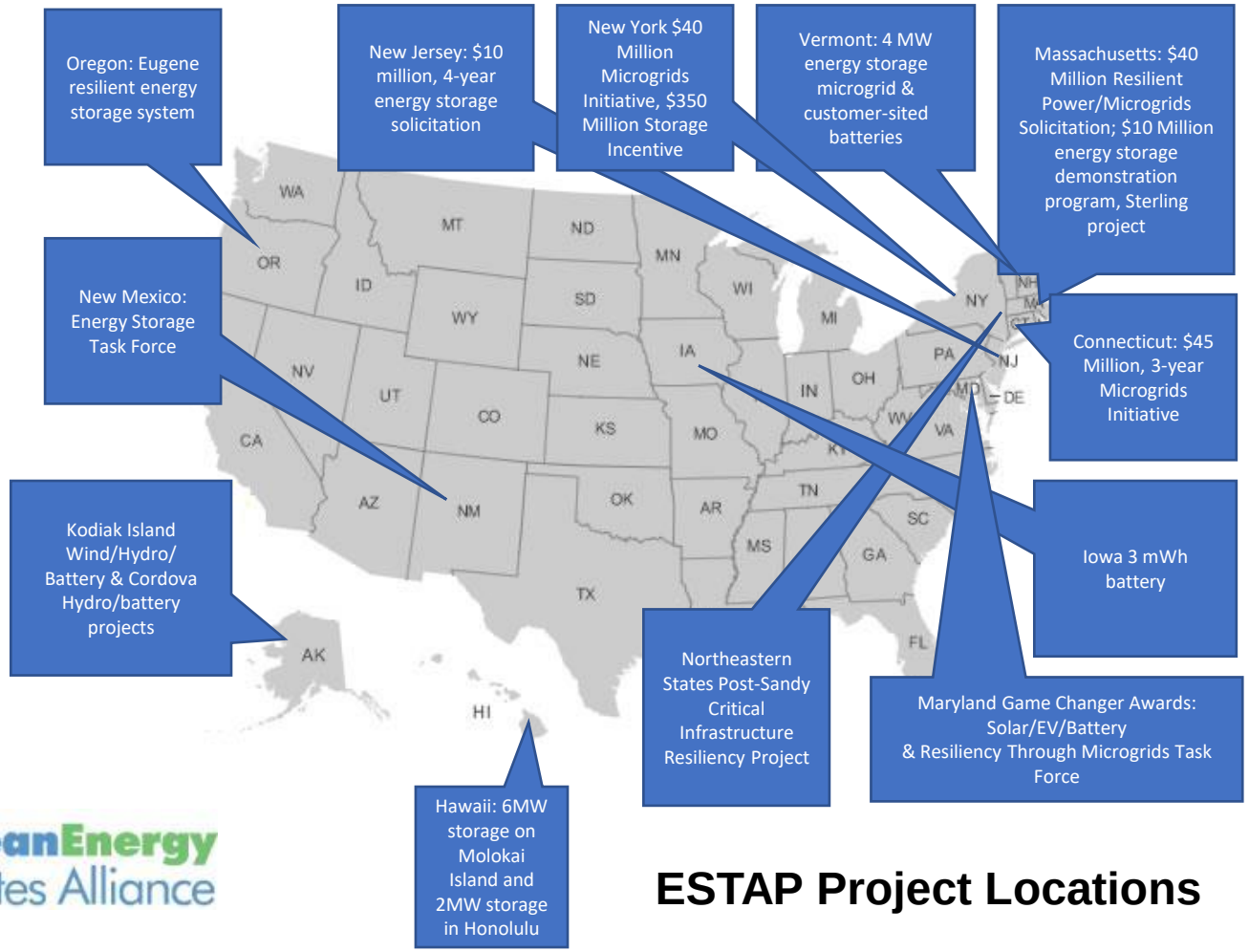
CleanEnergy
States Alliance

DOE-OE Energy Storage Technology Advancement Partnership

The Energy Storage Technology Advancement Partnership (ESTAP) is a US DOE-OE funded federal/state partnership project conducted under contract with Sandia National Laboratories.

ESTAP Key Activities:

1. Facilitate public/private partnerships to support joint federal/state energy storage demonstration project deployment
2. Disseminate information to stakeholders
   - ESTAP listserv >5,000 members
   - Webinars, conferences, information updates, surveys.
3. Support state energy storage efforts with technical, policy and program assistance



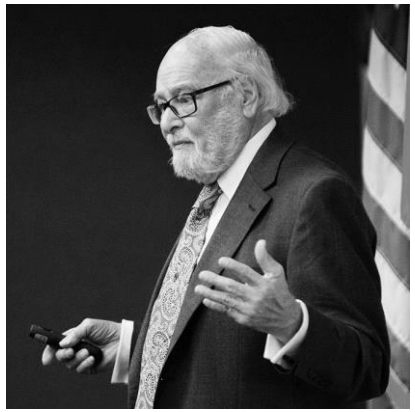
ESTAP Project Locations

U.S. DEPARTMENT OF ENERGY

Sandia National Laboratories

CleanEnergy States Alliance

Thank You!



Dr. Imre Gyuk
Director, Energy Storage Research,
U.S. Department of Energy

Dan Borneo
Engineering Project/Program Lead,
Sandia National Laboratories

U.S. DEPARTMENT OF ENERGY

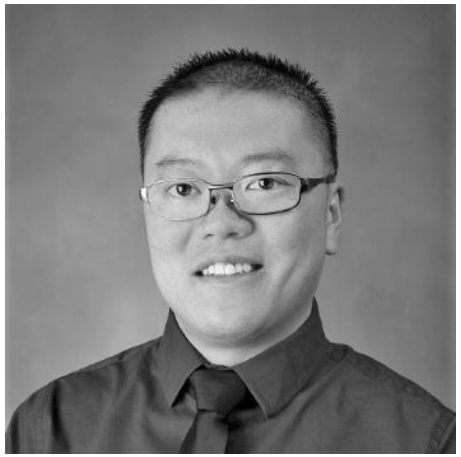
Sandia National Laboratories

CleanEnergy States Alliance

Webinar Speakers

Dr. Imre Gyuk
Director, Energy Storage Research, DOE Office of Electricity

Ryan Franks
Senior Mechanical Engineer, Pacific Northwest National Laboratory



Henry Guan
Electrical Engineer, Sandia National Laboratories

Dan Borneo
Engineering Project/Program Lead, Sandia National Laboratories

Todd Olinsky-Paul
Senior Project Director, Clean Energy States Alliance (moderator)

U.S. DEPARTMENT OF ENERGY

Pacific Northwest NATIONAL LABORATORY

Sandia National Laboratories

CleanEnergy States Alliance

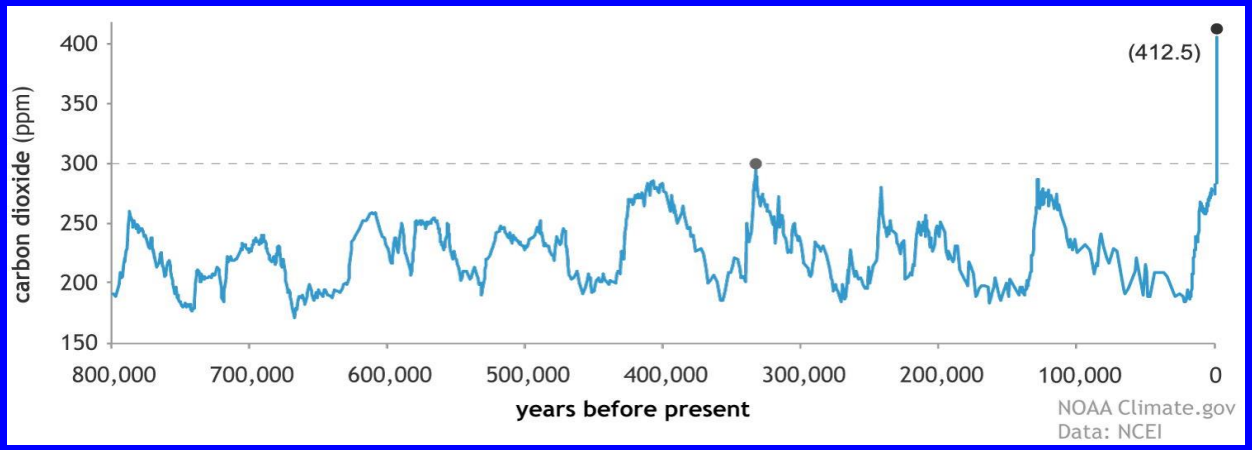
Developing Energy Storage Solutions to Achieve Social Equity for Urban, Rural, and Tribal Communities

IMRE GYUK, DIRECTOR,
ENERGY STORAGE RESEARCH, DOE-OE

Global Warming is Real and Worlwide!

NY, Hurricane Ida, Aug. 2021

U.S. West Coast: 400 year Drought

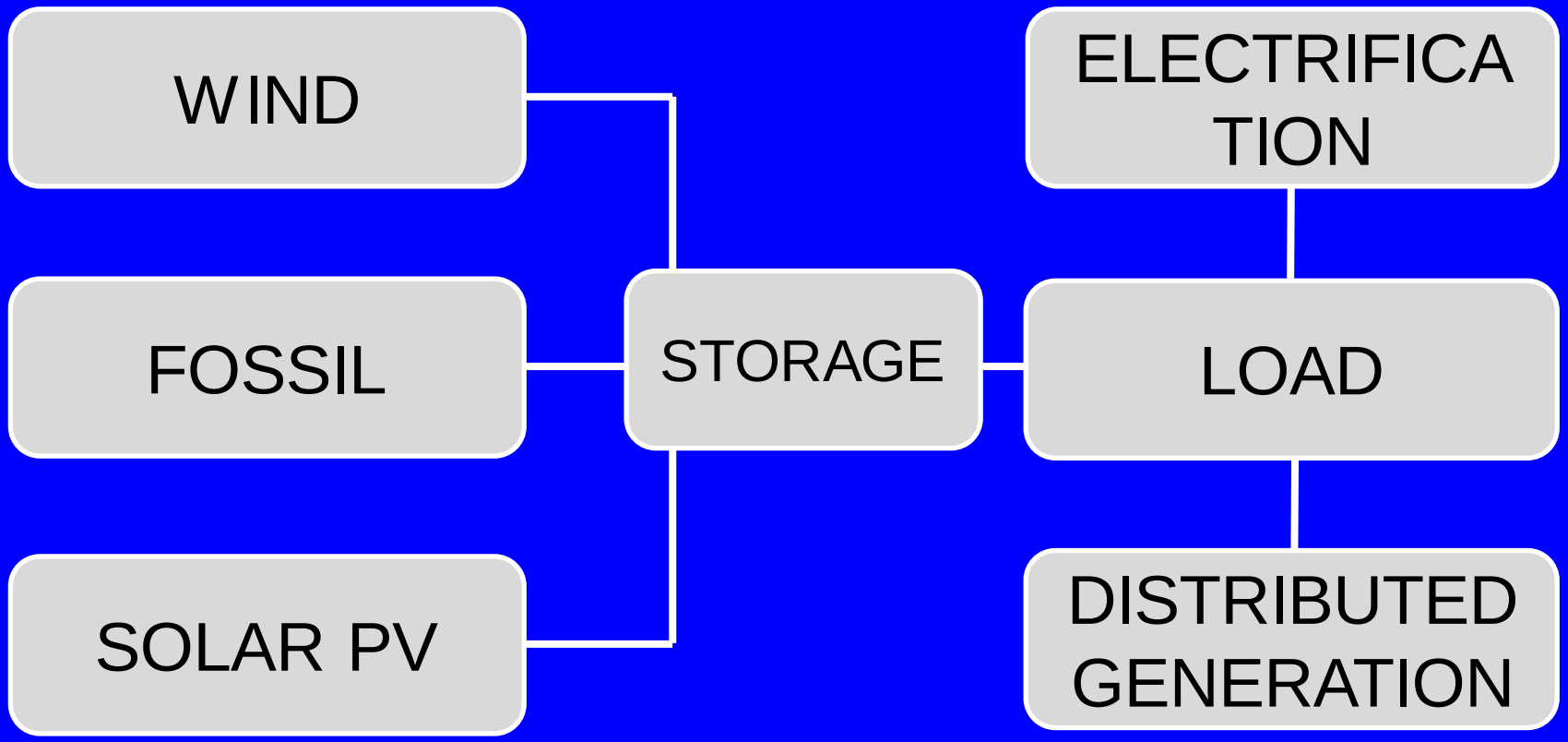


800,000 years Atmospheric Carbon Dioxide

Global Warming has Emerged
as a Paramount Issue - World Wide!

We must Decarbonize
We must all change to
Renewable Energy!

Variable Generation - Variable Load



For 100% Decarbonization we will need

to overbuid Renewable Power

and use Large Amounts of Energy Storage

to Balance Load and Generation

Minneapolis - Race

Iran - Water

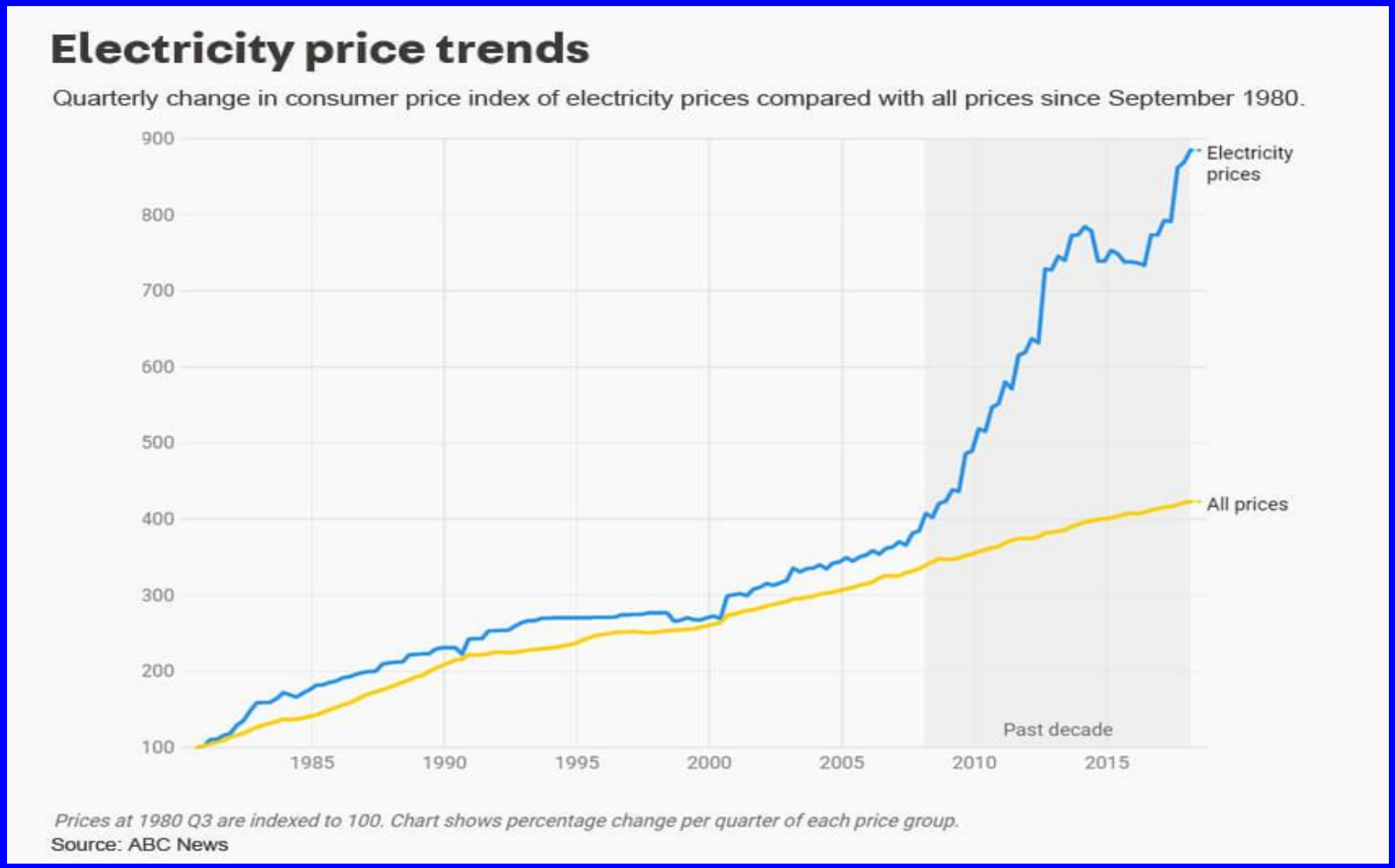
Athens - Food

Race, Water, Food.
Ultimately it's Poverty!

Social Unrest Can lead to Society Collapse.

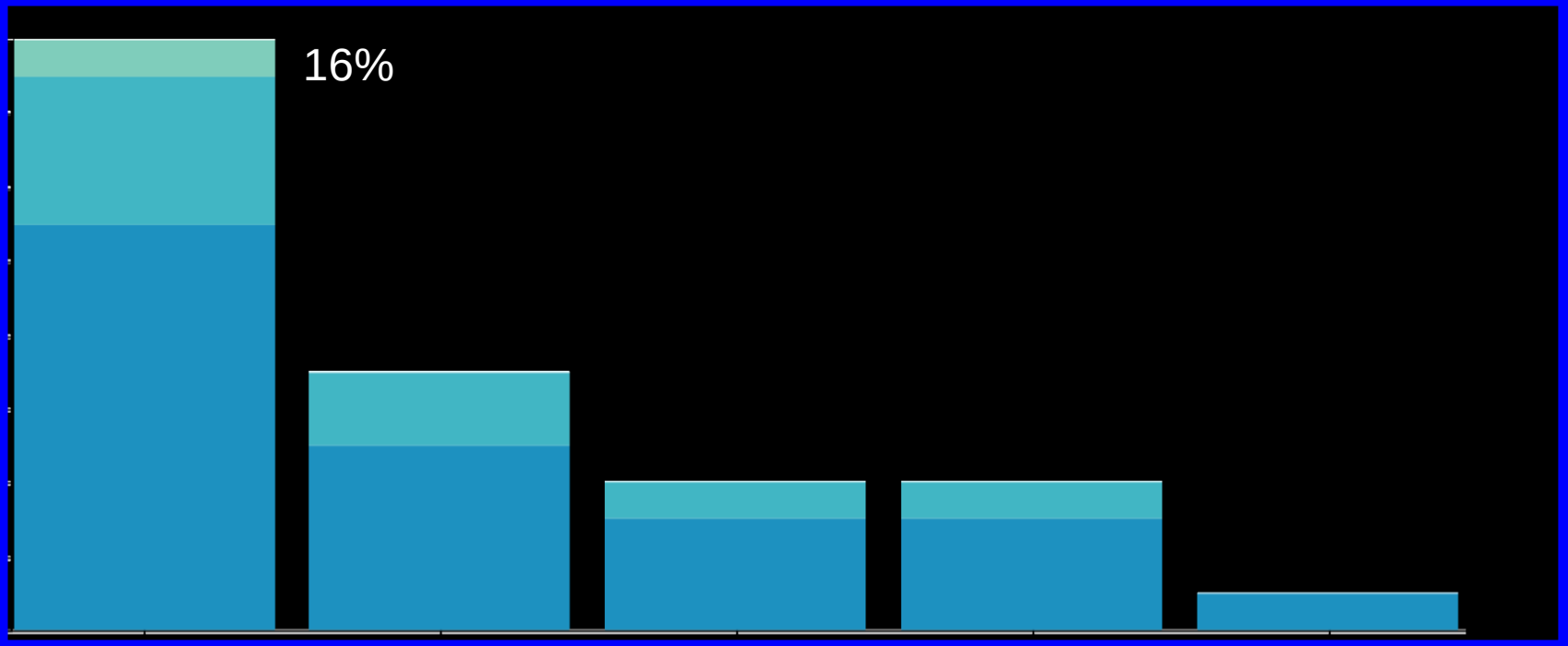
Decarbonization will entail
a vast Reorganization
Of the entire Electricity Industry.

It is important that we not
create or proliferate an “Energy Divide”
which finds less affluent communities
left behind!



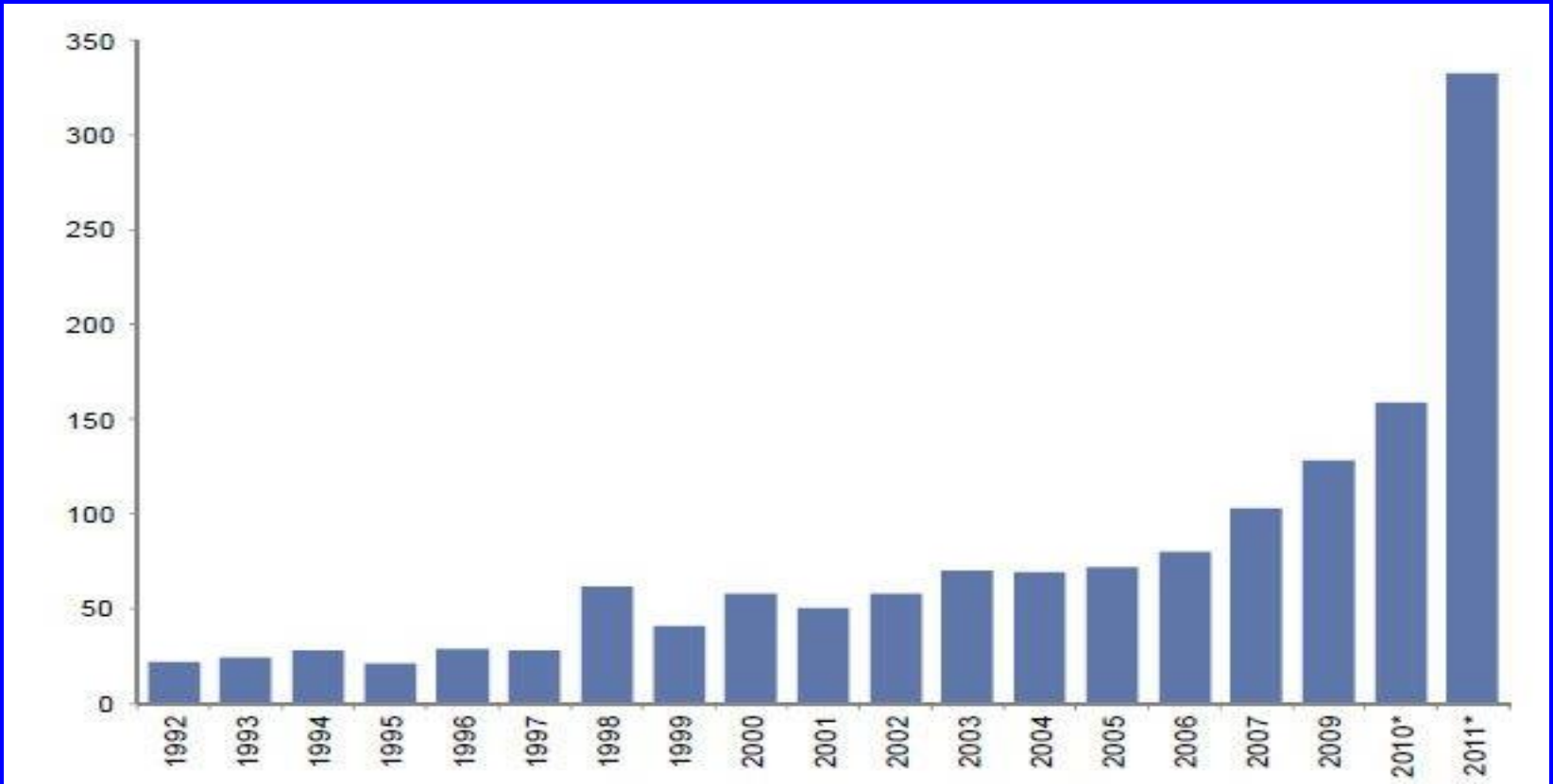
For the past decade electricity prices have been rising substantially

Average Energy Burden (% of Income)



From S. Baker/Yale

Major Power Outages in North America



NERC

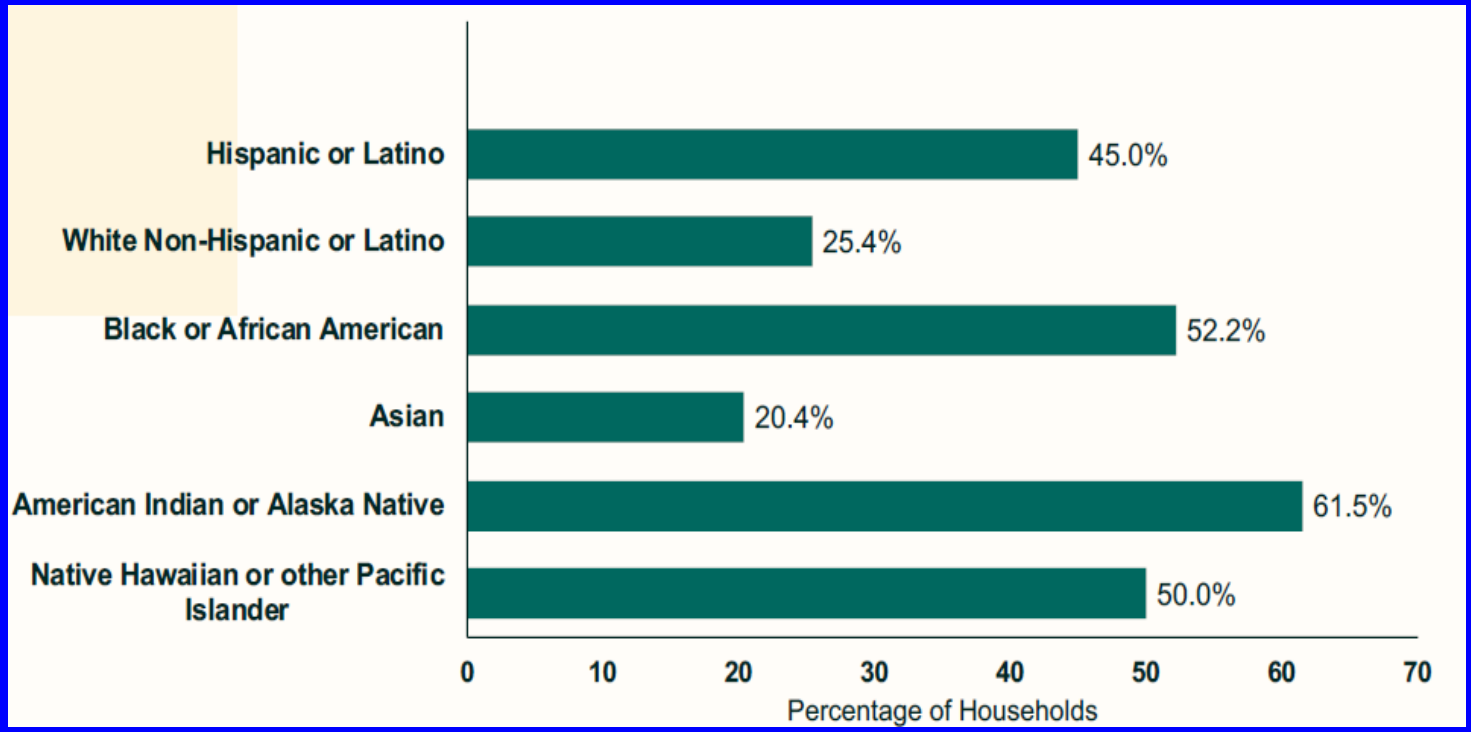
Power outages are increasing, partially due to Global Warming

Extreme heat causes more deaths
than any other natural disaster.

Studies show that temperatures
in less affluent neighborhoods of cities
may be 15-20 deg F higher than
in tree shaded suburbs.

Outages and electricity prices
affect the poor disproportionally!

Households Experiencing Energy Insecurity (2015)



From: S. Baker/Yale

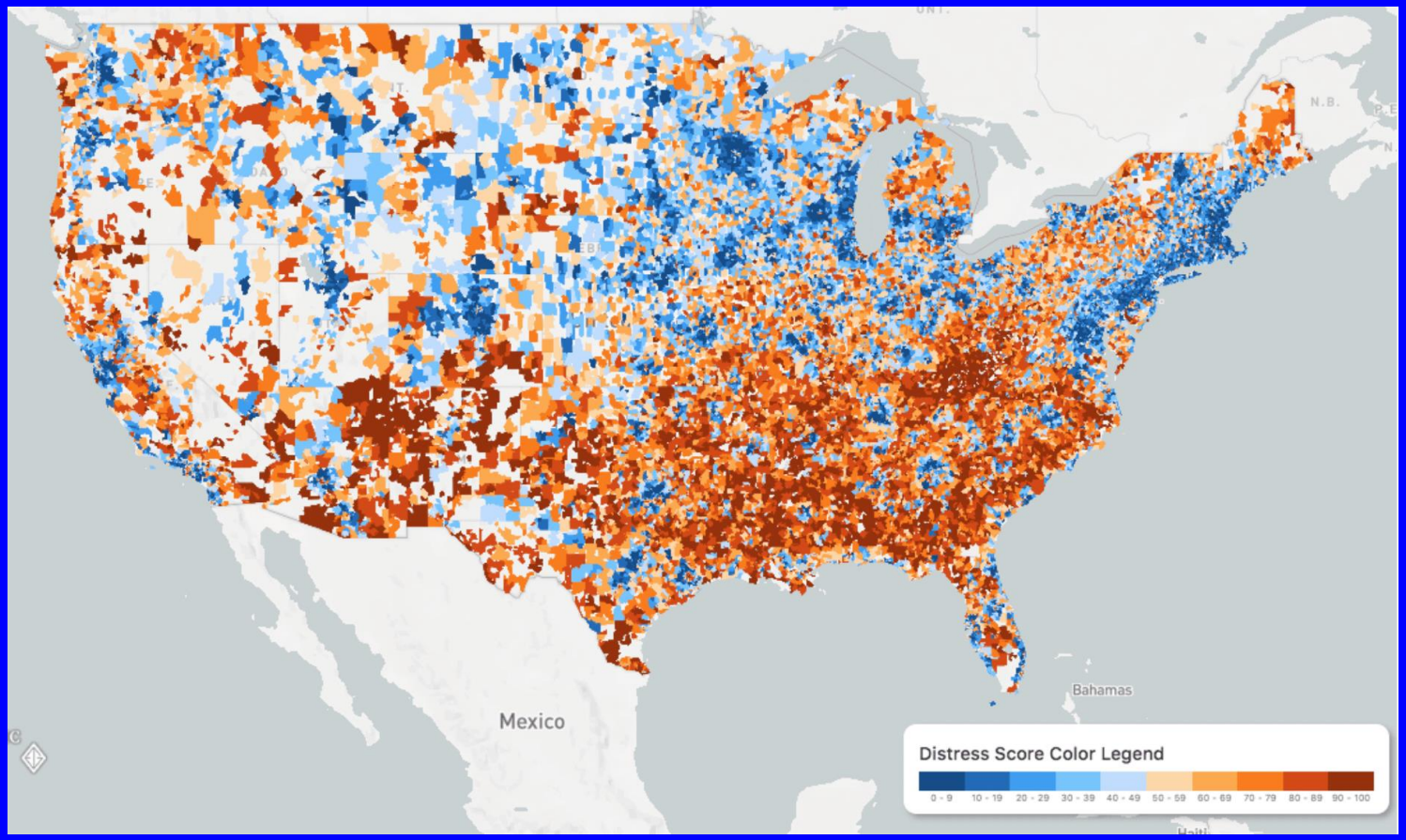
Lower income households are disproportionally non-white

Outages tend to be more frequent
in poor areas and take longer to mitigate

Electricity Assets are often located
In the least affluent neighborhoods
leading to health issues.

Resiliency Measures like rooftop solar
and behind the meter storage tend to
be installed by the more affluent

Electrification (e.g. EV) benefits the
more affluent, but infrastructure costs
are borne by all



Distressed Communities can be found throughout the U.S.

Energy Storage offers itself
as a tool to alleviate
many of these problems

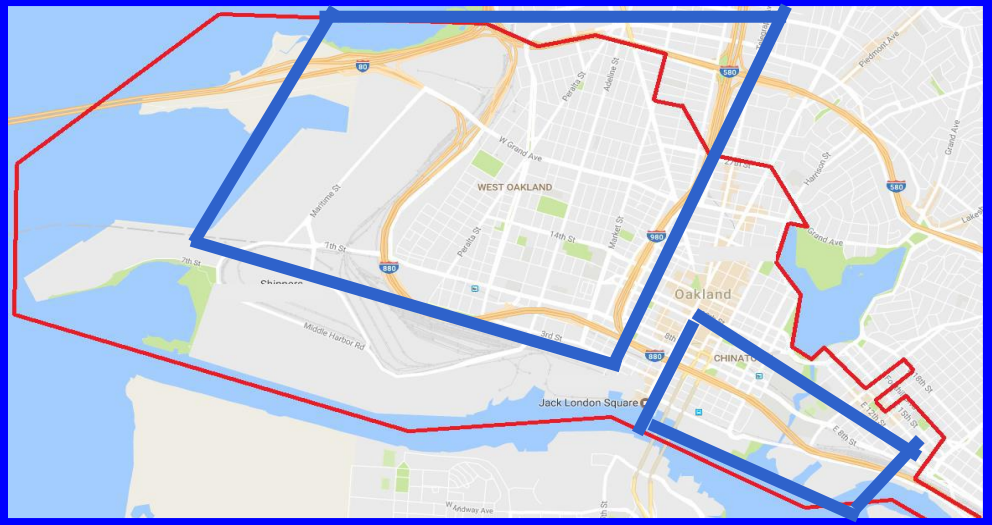
e.g. Storage to replace
Fossil Fuel Peakers

Microgrids with Storage
for outage mitigation

Solar + Storage for
Remote Tribal communities …..

Oakland, CA Peaker and DAC Area

40 year old Peaker
168MW Jet Fueled, using
868,000 gallons / year



Nearby DAC Areas are exposed to Nox, Sox, and Particulates causing Respiratory Problems

East Bay Community Energy Proposal:
100MW Solar, 30 MW/120 MWh storage + 57.5 MW Wind

Cordova, Alaska, Municipal System

Cordoba, Grid Isolated

6MW Run of River Hydro + 2MW Diesel

1MW/1hr Storage Replaces
0.5MW Spinning Reserve
Eliminates 2MW Diesel

Hydro: $0.06/kW;
Diesel: $0.60/kW

1 MW / 1 hr Li-ion Storage, Saft

Bad River Band of Lake Superior Chippewa in Wisconsin (DOE Indian Energy)

July 2016 Flood caused
Multiday Power Outage

Energy Sovereignty: $2M Microgrid

- Admin. Building
- Wastewater Treatment Plant
- Health & Wellness Center

May 2021: 500 kW Solar
500kW/1 MWh Storage

Resiliency, Sustainability, Predictable Budget

We need to develop new metrics
and new models that allow
inclusion of Social Equity
in the operation of Utilities
and in Statewide
Integrated Resource Planning

Assuring Energy Equity
for Urban, Rural, and Tribal
Disadvantaged Communities
should be a High Priority for the U.S.

How is Social Justice to be Financed?

What is the Business Case?

Investment Tax Credits?

Qualified Opportunity Zones?

Look out for Finance Summit
on Social Equity Projects Feb. 2022!

DOE Initiative ES4SE:
Energy Storage for Social Equity

15 communities to be selected
to receive detailed Technical Assistance

***

5 communities will be chosen
to partner in constructing
an energy storage facility.

https://www.pnnl.gov/projects/energy-storage-social-equity

We need much more Energy Storage!
And we need it bigger and safer,
less expensive and longer in duration.
And we need to apply it in equitable ways.
If we don’t do this, we are in very deep Trouble!

Energy Storage for Social Equity (ES4SE): An Introduction to the DOE-OE Initiative

November 1, 2021

Ryan Franks

Visit the ES4SE website for more information:
https://www.pnnl.gov/projects/energy-storage-social-equity

Pacific Northwest National Laboratory

PNNL is operated by Battelle for the U.S. Department of Energy

PNNL-SA-168083

Links Between Energy Storage & Community Objectives

WHY **ENERGY STORAGE**?

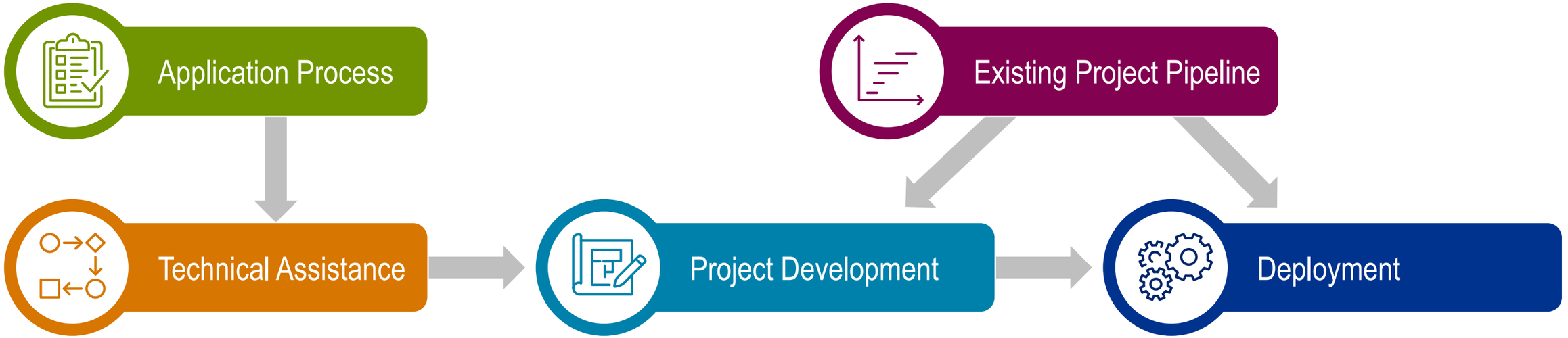
- **Locational flexibility**
- **Wide applications**
- **Broad uses for storage**

HOW CAN ENERGY STORAGE SUPPORT **COMMUNITY GOALS** AND ADDRESS **NEEDS?**

- **Access**
- **Affordability**
- **Environmental Impact**
- **Social Impact**
- **Decarbonization**
- **Resiliency**

ES4SE Program Overview

Goal: *support disadvantaged communities that suffer from relatively higher impacts from energy service disruptions and cost. Through this program, eligible communities have access to direct, non-financial technical assistance and potential support for new energy storage project development and deployment.*



OUTCOMES

Connect disadvantaged communities with energy solutions that support equitable outcomes

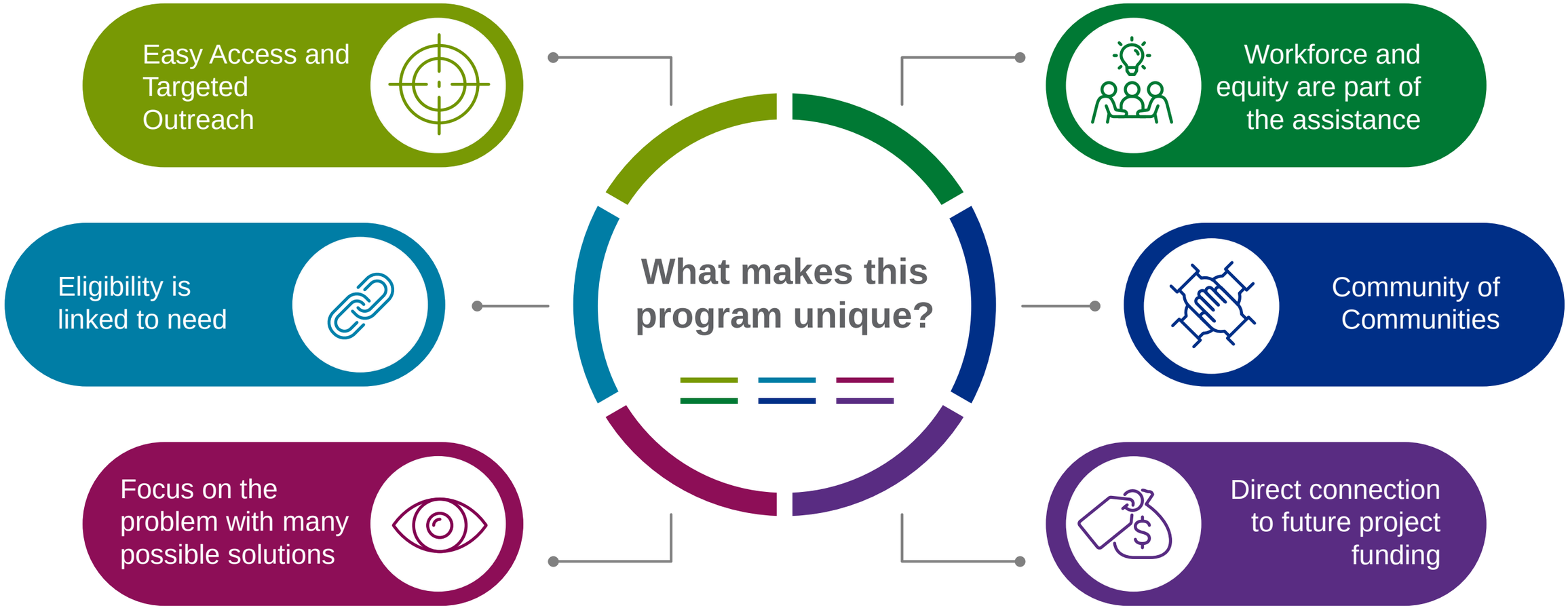
Demonstrate the role of energy storage in energy equity

Develop methods and metrics to analyze impact of investment on equity

Report on lessons learned and best practices to support future work across DOE

Grow and strengthen DOE project pipeline

ES4SE Distinctions



1. Executive Order 13985 Advancing Racial Equity and Support for Underserved Communities Through the Federal Government https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/
2. Executive Order 14008 Tackling the Climate Crisis at Home and Abroad https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/
3. Equity in Energy™, Office of Economic Impact and Diversity: https://www.energy.gov/diversity/equity-energytm

ES4SE TA Overview

OBJECTIVE

Provide technical assistance (TA) to disadvantaged communities to advance energy equity by identifying energy challenges and achieving community-defined goals

GOAL

Transition communities from problem to solution-identification through technical analysis and partnership development

PROCESS

- Pacific Northwest National Laboratory and Sandia National Laboratory provide TA through in-kind guidance, training, analysis, and support
- Utilize group forums for TA participants to connect, share, and learn from other participants

Technical Assistance (TA)

Lead: PNNL

Number of communities selected:
10 – 15

TA will vary based on project, but options may include:

- Energy Analysis
- Economic Analysis
- Grant/funding application assistance

All TA is accompanied by equity and workforce analysis

TA is free to selected communities but is not accompanied by funding

Results of the Technical Assistance

Technical Assistance Results in a Project Development Framework including:

- **Technical feasibility**: siting, sizing, site-specific considerations
- **Economic benefits**: direct energy savings and indirect economic activity
- **Social equity benefits**: workforce development, decarbonization, decreased pollution
- **Finance and contractual feasibility**: options and identification of stakeholders

Technical Assistance moves the project from idea to plan

Levels of Technical Assistance

Equity challenges	How can energy storage play a role?	Example use cases of energy storage to support community objectives:
Access	Energy storage, when integrated with a fuel source (fossil or renewable), can provide energy access.	• Unelectrified areas • Limited resource availability • Disconnection rates • System capacity for small-scale renewables, efficiency, or electrified vehicles • Eligibility for demand response programs • Future load growth
Affordability	Energy storage can reduce energy costs for consumers, increasing energy affordability.	• Energy cost burden • Demand charges • Energy market revenue • Shut-off notices for non-payment
Decarbonization	Energy storage can be integrated with renewable energy to provide clean energy in place of traditional fossil fuel systems.	• Climate/renewable energy targets (solar, wind, etc.) • Fossil fuel power plant decommissioning • Peaker power plant replacement
Environmental Impact	Energy storage can replace Peaker plants or backup generators.	• Health improvement • Air quality improvement • Emissions reduction
Resilience	Energy storage can be integrated with energy systems to provide energy that is accessible during extreme weather events.	• Avoided energy outages • Avoided disruption costs (financial and otherwise) • Enhanced reliability • Sustained critical loads during extreme events and natural disasters (particularly for infrastructure that supports multiple stakeholders such as a community center, cooling center, library, school, etc.)
Social Impact	Energy storage can serve as a community asset.	• Energy independence • Wealth creation • Community ownership • Community building

Conceptual Example

A municipality with wholesale energy supplier support has geographic energy constraints and faces high demand charges that could be mitigated by an ESS.

Intensity	Technical & Energy Analysis	Project Development & Financing Analysis	Equity Outcome Analysis
1	X		
2		X	
3			X

Who Can Apply?

- Community development organizations
- Economic development organizations
- Non-profits
- Non-governmental organizations
- Administrative departments (e.g., school/water/sewer districts)
- Municipalities/counties/cities/towns
- Commercial entities
- Tribal organizations and departments
- Utilities and electric cooperatives

TA Selection Criteria

Selection Criteria

- Impact potential of energy storage to contribute to community objectives
- Unique value of laboratory analysis (limited funding, need for scoping work, potential public benefit, etc.)
- Strength of team described in the application to support the technical assistance process, develop a cohort with other participants, and support the community.
- Likelihood of technical feasibility to enable implementation of solution identified in technical assistance.
  Note: this program does not include implementation/demonstration/deployment

Form Questions

- What will this assistance help you do?
- Why do you think analysis or partnership with us will help you with that outcome?
- What previous work have you conducted or are aware of are aware of that has been conducted that would contribute?
- Who is on your team?
- Why are you/the team a relevant stakeholder to the disadvantaged community?
- What is your vision of the energy system that overcomes the current challenges?

TA Process

1

Complete and submit Interest Form*

Due: 5 P.M. PT on Friday November 5th, 2021

2

A PNNL team member will schedule a follow-up with interested parties to review the program and application*

3

Complete and submit the Application Form

Due: 5 P.M. PT on Friday December 3rd, 2021

4

Applicants are Notified of application decision by February 2022

Visit the ES4SE website to apply: https://www.pnnl.gov/projects/energy-storage-social-equity

* Steps 1 and 2 are optional – designed to ensure applicants are eligible and provide any assistance necessary to ensure program and application are clear. If applicants decide not to submit an interest form, they can still apply.

This work was supported by:

US DOE Office of Electricity

We thank Dr. Imre Gyuk
Manager of the DOE Energy Storage Program

https://www.pnnl.gov/projects/energy-storage-social-equity

ES4SE@pnnl.gov

Supplementary: TA Eligibility

Eligibility Criteria

- Technical assistance will be **beneficial** to a disadvantaged community
- Disadvantaged community experiences problems or challenges with their energy system that **can be addressed** or partially mitigated through electric service delivery and/or energy storage
- Applicant must have the **capacity** to support the technical assistance process
- Applicant must have **credibility** to support the disadvantaged community

Form Questions

- Describe the disadvantaged community setting (select all that apply).*
- Energy objective of interest (select all that apply).*
- Please describe, in a few sentences, why you are interested in this technical assistance program.
- **Partnership and collaboration is key to success**. Applications will be selected on whether the applicant team has the capacity (time, effort) to interact with the technical assistance provider and use the results. In the box below, please describe the team or applicant. If the applicant anticipates capacity issues but believes they would be a good candidate for the technical assistance process, please explain.
- **For the technical assistance to advance equity, community voices and consultation is essential.** The applicant must be a relevant stakeholder or representative for the identified disadvantaged community. Briefly describe the applicant's relationship to the community.

Supplementary: TA Applicant Eligibility Criteria

Identified Disadvantaged Communities* (select all that apply):

- ☐ Low income, high and/or persistent poverty
- ☐ High unemployment and underemployment
- ☐ Racial and ethnic segregation
- ☐ Linguistic isolation
- ☐ High housing cost burden and substandard housing
- ☐ Distressed neighborhoods
- ☐ High transportation cost burden and/or low transportation access
- ☐ Disproportionate environmental stressor burden and high cumulative impacts
- ☐ Limited water and sanitation access and affordability
- ☐ Disproportionate impacts from climate change
- ☐ High energy cost burden and low energy access
- ☐ Jobs lost through the energy transition
- ☐ Access to healthcare
- ☐ Tribal jurisdictions
- ☐ Other (must explain below)

Energy objective of interest (select all that apply):

- ☐ Access
- ☐ Affordability
- ☐ Decarbonization
- ☐ Environmental Impact
- ☐ Resiliency
- ☐ Social Impact
- ☐ Other (must explain below)

*utilized by the DOE Office of Economic Impact and Diversity

Supplementary: Communities LEAP Program

DOE recently released the Communities LEAP Program. How does ES4SE relate to the Communities LEAP Program?

- The Communities LEAP Pilot focuses on communities facing direct economic impacts from a shift away from historical reliance on fossil fuels, while ES4SE is open to all disadvantaged communities.
- For the ES4SE Initiative, the technical assistance is integrated with a pathway to deployment, whereas Communities LEAP is a broad TA program.
- Communities LEAP requires communities to be confident of the desire to pursue a clean energy transition and clean energy economic development, while ES4SE Initiative will work with communities to explore their needs and potential solutions.
- The ES4SE Initiative is focused on energy storage, but will work with communities to identify other solutions and pursue opportunities.

ES4SE Projects Overview

OBJECTIVE

Provide engineering support for project development and deployment of systems

GOAL

Transition an identified solution into a system deployment to meet community defined goals

PROCESS

- Sandia National Laboratories and Pacific Northwest National Laboratory to provide project demonstration and deployment support through Sandia's existing demonstration program

Project Development and Deployment

Lead: SNL

Number of communities selected:

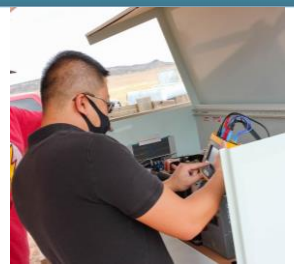
Up to 6

Project support will vary based on project, but support may include:

- System and Equipment Sizing
- Site Development
- Design Review
- System Safety Review
- Installation and Commissioning Guidance
- System Performance Validation
- Potential Cost Share Funding

Energy Storage for Social Equity (ES4SE)

Project Development and Deployment Assistance



Presented by:

Henry Guan

CESA Webinar

The Energy Storage for Social Equity Initiative (ES4SE)

Call for Applications and Upcoming Webinar

November 1st, 2021

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

SAND2021-13699 PE

Agenda

- **Sandia's Demonstration Projects Program**
- **Sandia's Role in ES4SE**

Demonstration Projects Team Overview

Sandia Demonstration Projects Team

SANDIA TEAM

Projects	Dan Borneo
	Waylon Clark
	Henry Guan
Analytics	Tu Nguyen
	Andrew Benson
	Alvaro Furlani-Bustos
	Ujjwol Tamrakar
	Rodrigo Trevizan
	Hyungjin Choi

OTHERS

Matt Paiss (PNNL)

Charlie Vartainian (PNNL)

Todd Olinsky-Paul (Clean Energy States Alliance)

Susan Schoenung (Longitude 122 West, Inc.)

Russ Weed (Clean Tech Strategies, LLC)

Sandia Demonstration Projects Team

What we do: *The Projects team supports utilities, state energy offices, academia, and the overall ES industry to proliferate the use of energy storage on the nation's grid. Sandia's work allows the DOE to inform the nation's understanding of ES application optimization, energy storage operation, system reliability, and the economic impact of energy storage in different market environments.*

WORK WITH UTILITY, INDUSTRIAL, COMMERCIAL, PRIVATE, STATE AND INTERNATIONAL ENTITIES

Support the development and implementation of grid-tied ESS projects

- Engineering Analysis
- RFI / RFP Document Development
- Design, Procurement, & Construction Support
- Commissioning Plan Review, Implementation, and Operational Support

Monitor and analyze operational energy storage projects

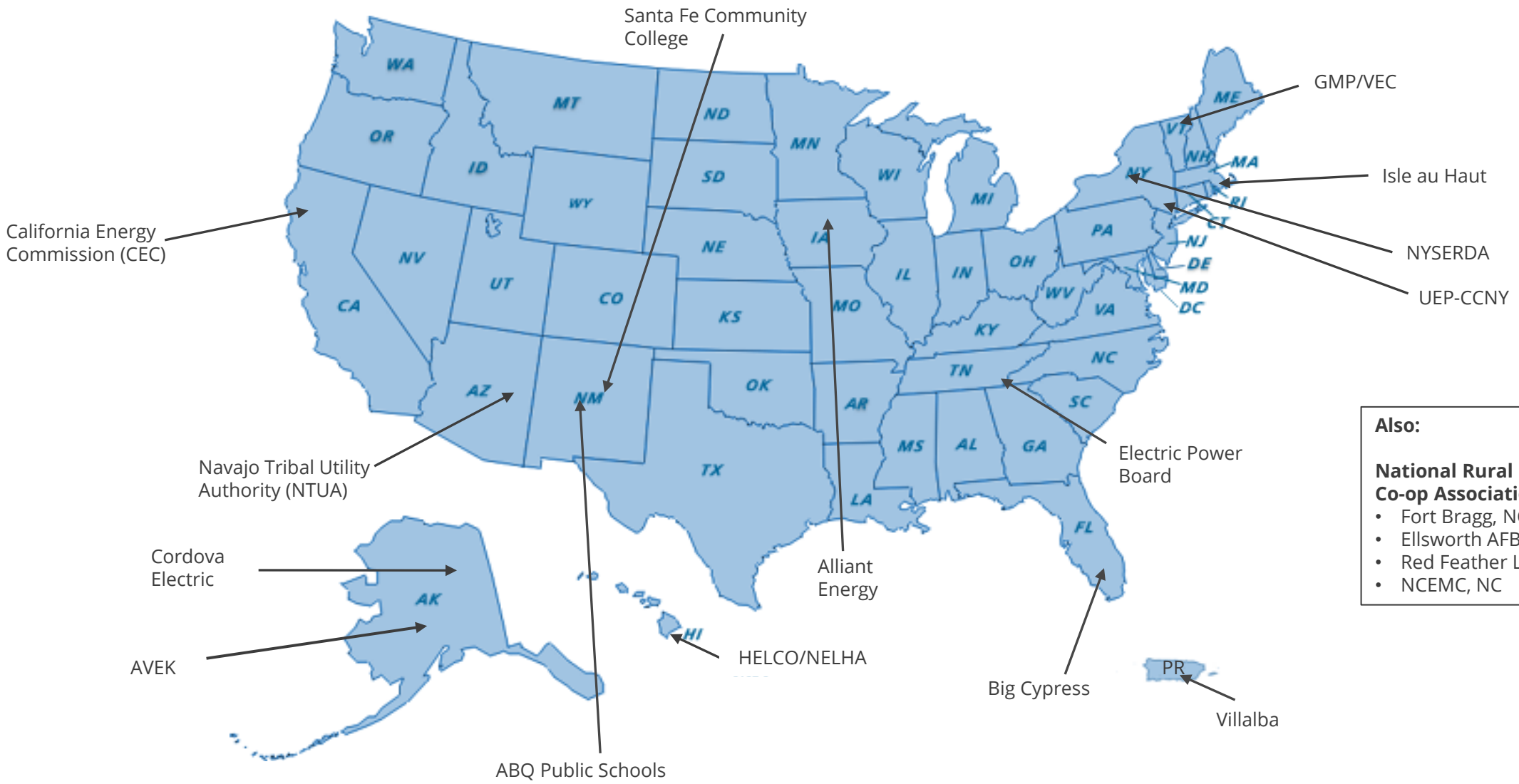
- Validate technical analysis models and results

Provide awareness

- Develop public information programs
- Demonstrate innovative installations to inform industry of best practices
- Webinars, workshops, presentations, etc.

DOE/SNL Energy Storage Projects

FY21 ~ 20 Projects



Also:

National Rural Electric Co-op Association

- Fort Bragg, NC
- Ellsworth AFB, SD
- Red Feather Lakes, CO
- NCEMC, NC

Project Development and Deployment Assistance

ES4SE Projects Overview

OBJECTIVE

Provide assistance in the development and deployment of energy storage systems through Sandia's existing Demonstration Projects program for the benefit of disadvantaged communities

GOAL

Assist projects by providing engineering expertise in translating solutions identified in ES4SE technical assistance into real world solutions

PROCESS

Successful ES4SE technical assistance and initial pipeline candidates will be evaluated and selected for project development and deployment support based on project merits and qualifications

Project Development and Deployment

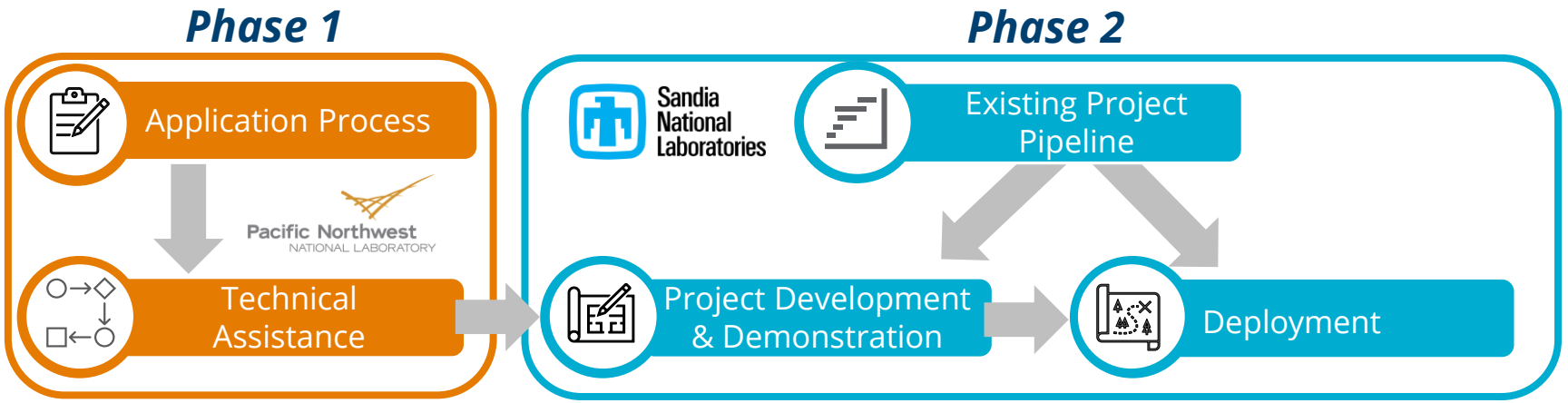
Number of communities selected:
Up to 6

Project support will vary based on project, but support may include:

- System and Equipment Sizing
- Site Development
- Design Review
- System Safety Review
- Installation and Commissioning Guidance
- System Performance Validation
- Potential Cost Share Funding

ES4SE Program Overview

Goal: *support disadvantaged communities affected by unreliable and expensive energy systems and supplies. The program is designed to offer assessments on energy storage feasibility, design, and application to enhance community benefit outcomes. The program comes at a critical time to promote equity in the energy system and achieve the DOE's Justice40 initiative targets.*



OUTCOMES

Connect disadvantaged communities with energy solutions that support equitable outcomes

Demonstrate the role of energy storage in energy equity

Develop methods and metrics to analyze impact of investment on equity

Report on lessons learned and best practices to support future work across DOE

Grow and strengthen DOE project pipeline

Project Pipeline Overview

Initial Projects Pipeline

- **Clean Energy States Alliance (CESA) issued an Expression of Interest to gauge interest in project ideas for the Implementation of Innovative Energy Storage Pilot Projects on June 1st, 2021. Topics of interest included:**
  - Provide **resiliency and reliability** to rural electric grids
  - Advance **social equity**
  - Support installation of electric vehicle **fast charging stations**
- **Total of 23 responses were returned of which:**
  - **3** were **rural grid** related
  - **9** were **social equity** related
  - **6** were **fast charging** related
  - **5** were **other**
- The responses received under the category of "Advance Social Equity" formed the basis for initial project pipeline for the DOE OE Energy Storage for Social Equity Initiative

Project Development and Deployment

The following criteria will be taken into consideration when determining whether a proposed project or TA applicant is selected for Project Development and Deployment support:

- Is the Project scope well developed or is it in conceptualization?
- Did the applicant or their partners identify project execution resources (engineering, procurement, project management, etc)?
- Does the applicant have prior similar or relevant project experience?
- Does the Project have a site location selected?
- Does the Project have an estimated project cost?
- Has funding for the Project been secured?
- Is the Project using a high TRL technology?

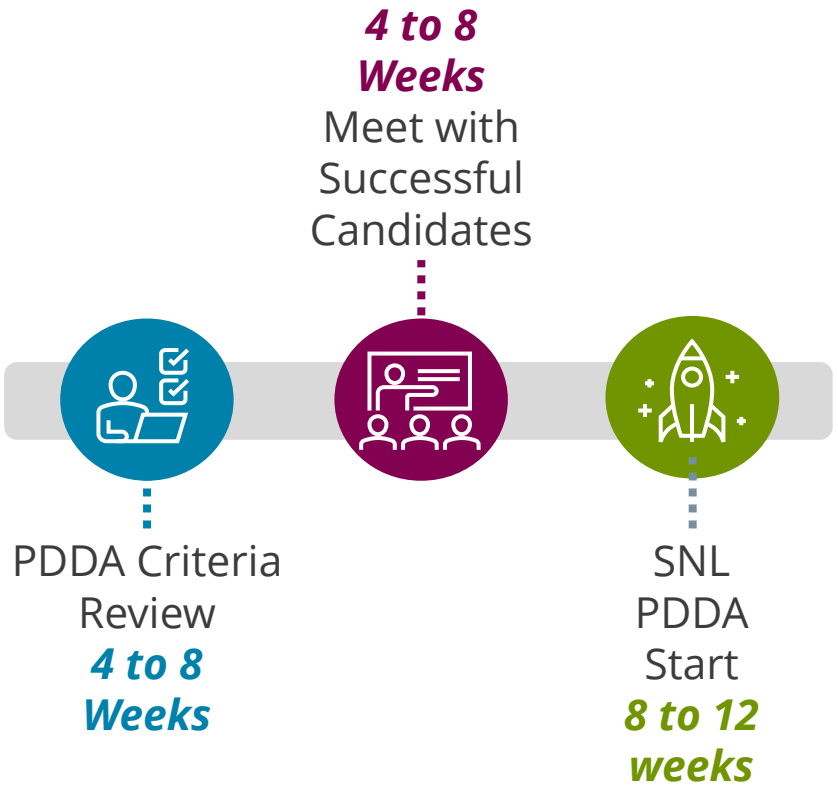
ES4SE PDDA Timeline

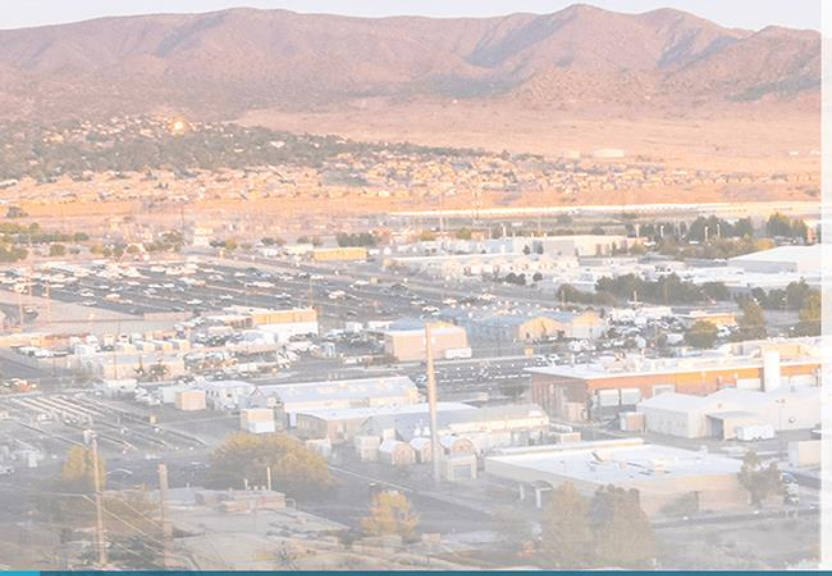
Phase 1

ES4SE Technical Assistance will be completed March-December 2022. Once TA is completed, successful TA Program participants will be evaluated against PDDA criteria and may be selected to receive additional assistance for **Phase 2 – Project Development and Deployment Assistance (PDDA)**

Phase 2

NOTE: Phase 2 timeline begins when Sandia receives list of participants for consideration from PNNL





This work was Directed by Dr. Imre Gyuk through the Department of Energy Office of Electricity Delivery and Energy Reliability (DOE-OE) Stationary Energy Storage Program.

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Sandia National Laboratories

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Thank You

Contact:

Henry Guan | hguan@sandia.gov

O: (505) 845-7524 | **C:** (505) 206-2257

This webinar was presented by the DOE-OE Energy Storage Technology Advancement Partnership (ESTAP)

Dr. Imre Gyuk
US DOE-OE
imre.gyuk@hq.doe.gov

Dan Borneo
Sandia National Laboratories
drborne@sandia.gov

Todd Olinsky-Paul
Clean Energy States Alliance
todd@cleanegroup.org

Val Stori
Clean Energy States Alliance
val@cleanegroup.org

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Exploring Europe's Approach to Using Offshore Wind for Green Hydrogen Production
Tuesday, November 9, 11am-12pm ET

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