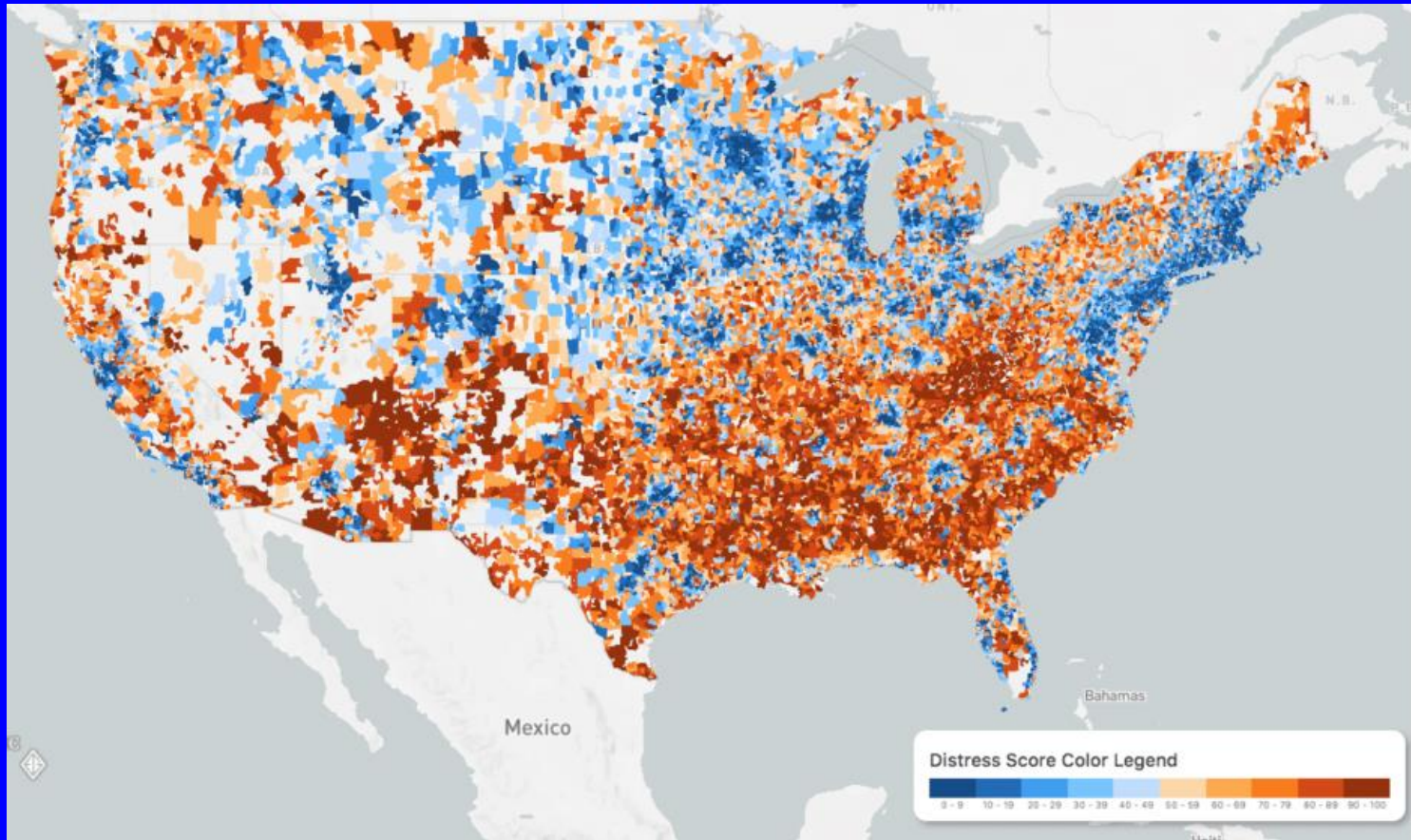


Energy Storage for Resilience and Social Equity

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

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

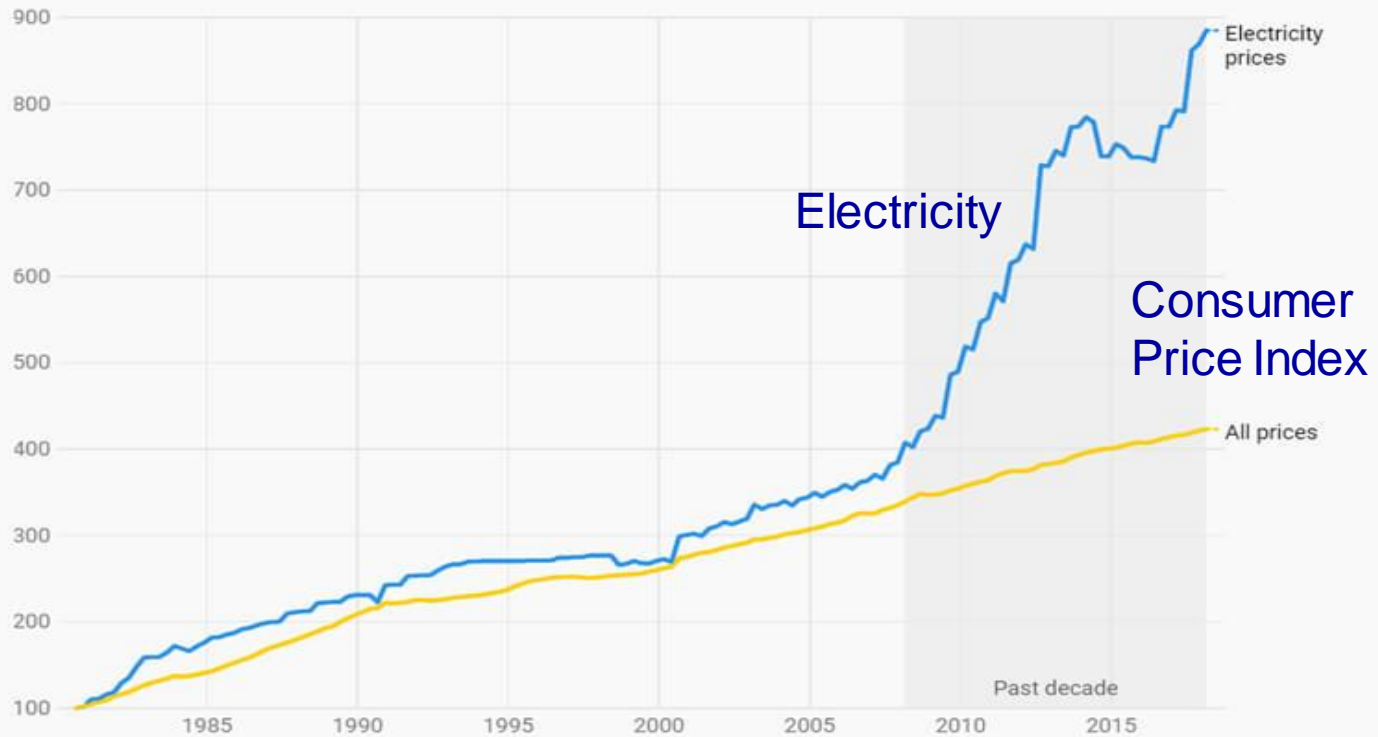
It is important that we not
create or proliferate an “Energy Divide”
which finds less affluent communities
left behind!



Distressed Communities can be found throughout the U.S. (VT 1% - MS 40%)

Electricity price trends

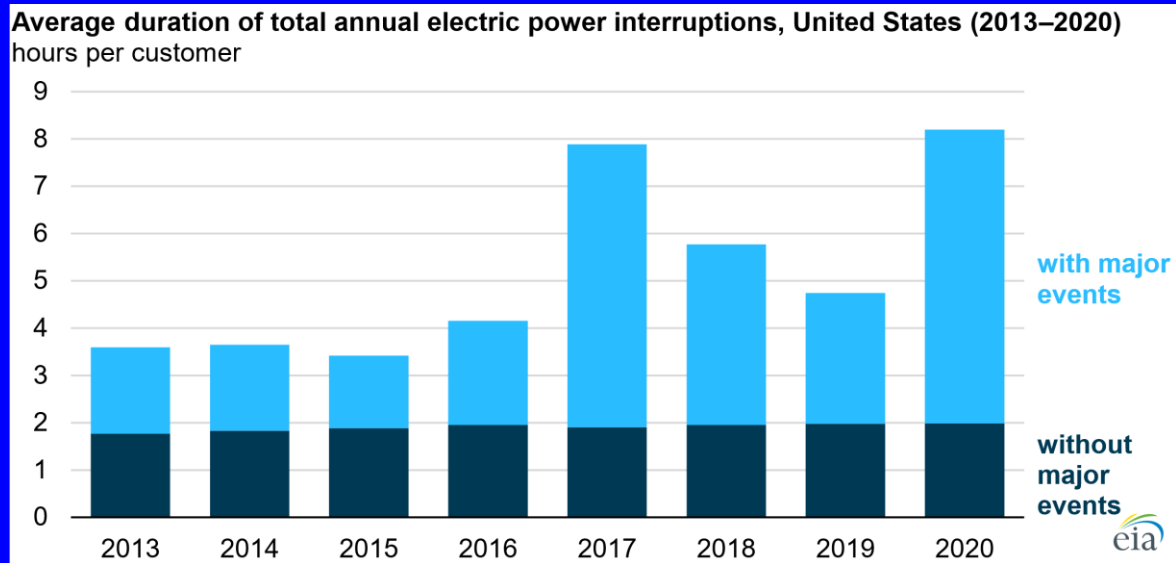
Quarterly change in consumer price index of electricity prices compared with all prices since September 1980.



Prices at 1980 Q3 are indexed to 100. Chart shows percentage change per quarter of each price group.

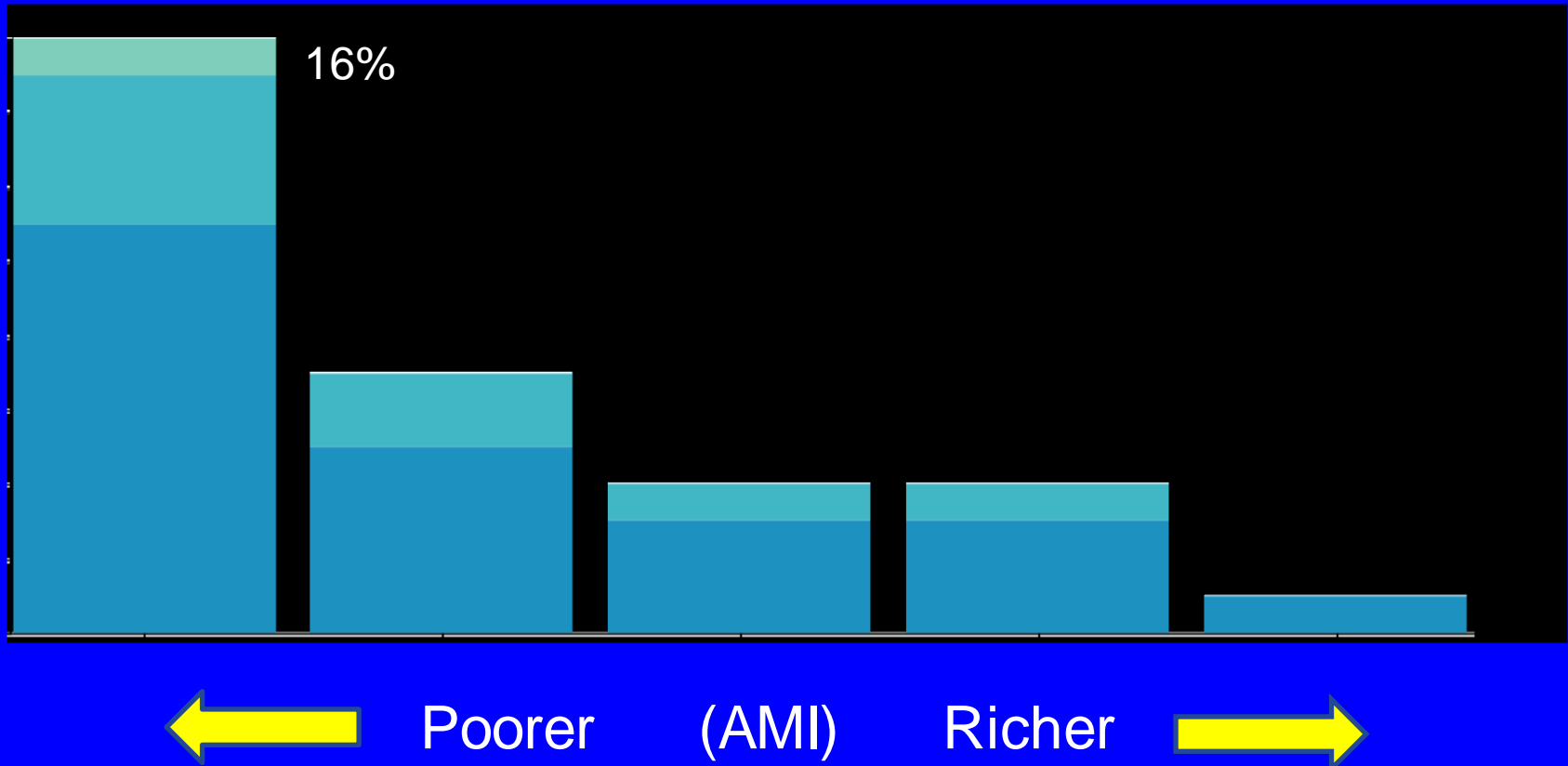
Source: ABC News

For the past decade electricity prices have been rising substantially



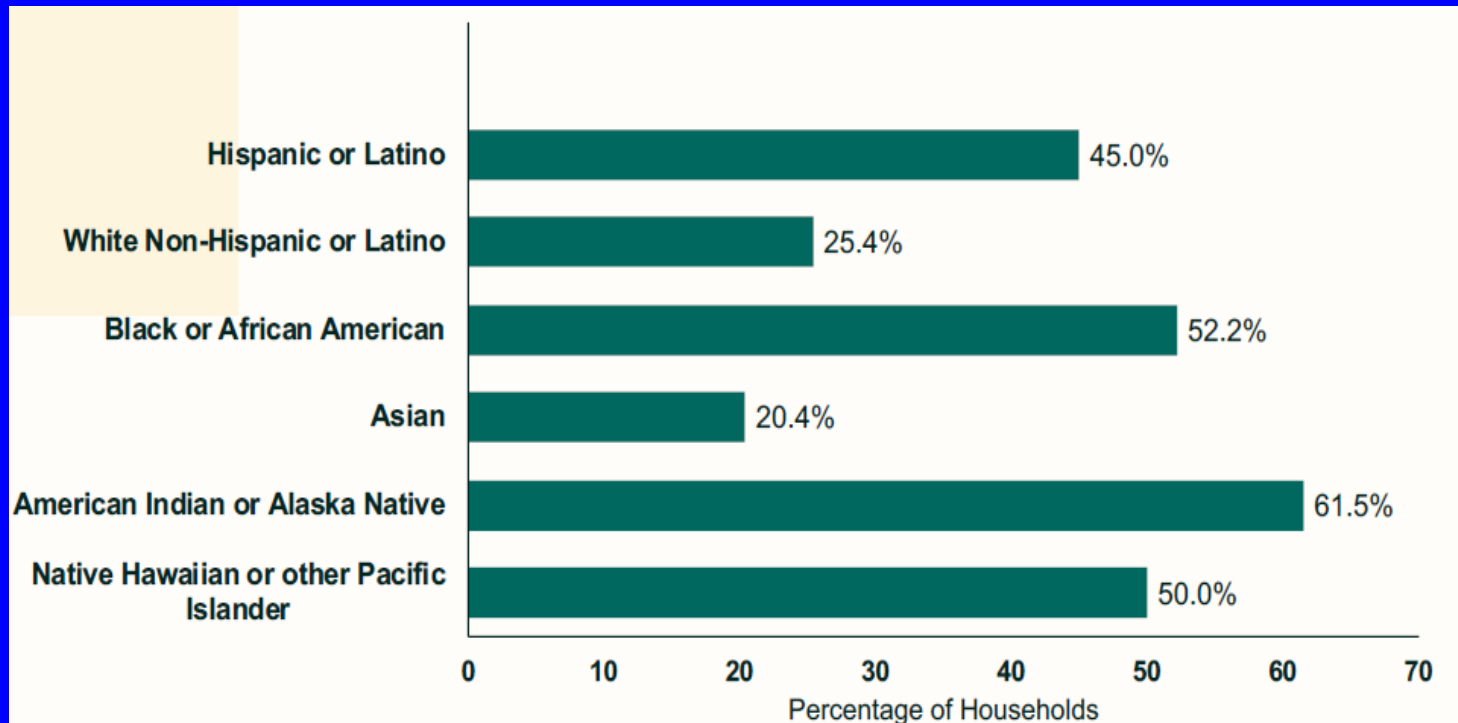
**Weather related Grid Outages
are becoming more Frequent**

Average Energy Burden (% of Income)



From S. Baker/Yale

Households Experiencing Energy Insecurity from Electricity Prices and Outages



Lower income households are disproportionately non-white

Energy Storage offers itself as a tool to alleviate many of these problems, e.g.

Storage to replace Fossil Fuel Peakers
to reduce health effects

Cooling Stations throughout the City

Microgrids with Storage
for outage mitigation

Solar + Storage for
Remote Tribal communities

Navajo Nation , AZ

Partnering with DOE-OE, Sandia, NTUA, UEP



Commissioned May 2022

Average Load 150W → 87hrs
PV = 1kW

3 kW / 13 day Rechargeable
Zn Mn O₂ Battery Developed
by UEP.

There are 18,000 Residents
off-Grid on the Reservation



Cordova, Alaska, Municipal System



Cordova, Grid Isolated



6MW Run of River Hydro Power

Total Generating Capacity:

6MW + 1.25MW Hydro; 2x 1MW Diesel

0.5MW Deflected as Spinning Reserve

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



Ribbon Cutting with Sen. Murkowski



1 MW / 1 hr Li-ion Storage

Commissioned June 7, 2019

- Frequency Regulation
- Load following
- Emergency Supply

Thanksgiving, Nov. 2019
2 days: 4hrs diesel vs. 48 hrs
\$10,000 in savings

Atrisco Heritage Academy, Albuquerque, NM

Energy Storage for Social Equity

85% Hispanic,

Reduce peak demand
during occupied hours

Battery: 721 kW/4hr = 2884 kWh
plus roof-mounted PV = 850 kW

Total cost with PV: \$3.1 M



Contract awarded – May 2021
Commissioned – Oct. 13, 2022

DOE Initiative ES4SE:
Energy Storage for Social Equity

14 communities selected to receive
detailed Technical Assistance from PNNL

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

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

Fourteen Communities Tribal, Rural, and Urban

Native Renewable, Flagstaff, AZ

Cher-Ae Heights Indian Community Trinidad, CA

Ayika Solutions Incorporated, Atlanta, GA

Ho‘āhu Energy Cooperative Molokai, Kaunakakai, HI

Together New Orleans, New Orleans, LA

Honor the Earth, Callaway, MN

Coast Electric Power Association, Kiln, MS

Joule Comm. Power & Open Door Mission, Rochester, NY

Warm Springs Community Action Team, Warm Springs, OR

Rogue Climate, Coos Bay, OR

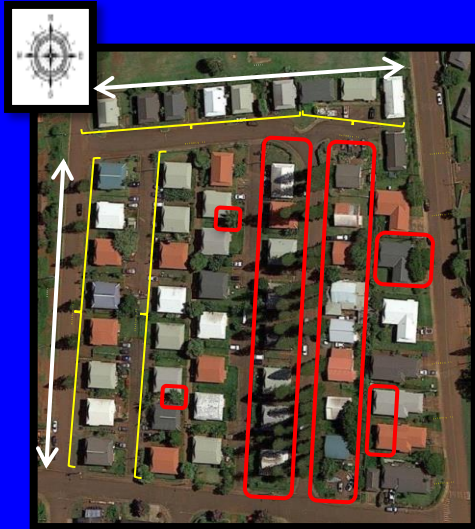
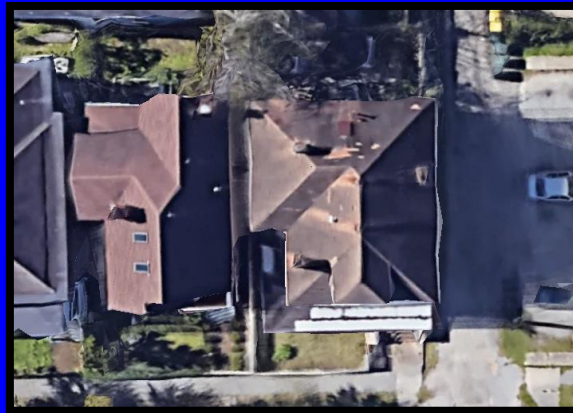
Coyote Steals Fire Energy Group, Pendleton, OR

Makah Tribe, Neah Bay, WA

Klickitat Valley Health, Goldendale, WA

Oneida Nation, Oneida, WI

Harambee House,
Savannah, GA
Small community Hub



Ho'ahu Energy Coop,
Molokai, HI
Off Grid Solar + Storage



Coast Electric Power
Kiln, MS
Wastewater Treatment



Native Renewables
Navajo and Hopi Res, NM, AZ
Off Grid Solar + Storage

First Tranche is now in process of learning the Procurement Process and getting ready for Construction with help from Sandia.

Second Tranche is being partially funded and is receiving Cost Share from various sources

A second cohort will be selected during 2024