



Energy Programs Office

Making Pennsylvania's Electric Grid Stronger during Extreme Weather Events

Using Infrastructure Investment and Jobs Act Funding to Prevent Outages and Enhance the Resilience of the Electric Grid

Public Meeting

August 31, 2022

www.menti.com Code: 3492 4901

Speakers

- **David Althoff Jr.**, Director, Energy Programs Office, Pennsylvania Department of Environmental Protection
- **Ernest Szabo**, Planner, EM Mitigation, Insurance & Resilient Communities Office, Pennsylvania Emergency Management Agency
- **Dan Searfoorce**, Manager, Water, Reliability and Emergency Preparedness Division, Pennsylvania Public Utilities Commission
- **Jessica Shirley**, Infrastructure Investment and Jobs Act Coordinator, Pennsylvania Department of Environmental Protection

What We'll Cover

- DEP Energy Programs Office and partners
- U.S. Dept. of Energy funding available
- Climate change impacts in Pennsylvania
- Hazardous threats management in PA
- Electric Grid 101
- U.S. DOE funding details
- Year 1 Draft Plan: "Making Pennsylvania's Electric Grid Stronger"
- Discussion/Questions: www.menti.com Code: 3492 4901



Damage from Hurricane Ida, Sept. 2021, southeastern PA

DEP Energy Programs Office

- Leads Pennsylvania's Climate Program
- Is U.S. Department of Energy-funded State Energy Program in PA
- The lead state program on energy issues and energy security planning
 - The Commonwealth Emergency Operations Plan directs DEP to provide technical assistance and state energy data and plans to leaders, stakeholders, all Pennsylvanians
- Key partners: Pennsylvania Public Utilities Commission and Pennsylvania Emergency Management Agency

U.S. Department of Energy

Building a Better Grid

Measurably improve the reliability and resilience of current and future electric grids against disruptive events by modernizing the grid infrastructure

A modern grid will:

- Enable consumer access to lower-cost energy and accommodate increased electrification
- Better accommodate increased percentages of variable renewable electricity, distributed energy resources, and prepare for enhanced electric system communication needs

U.S. Department of Energy Funding Program

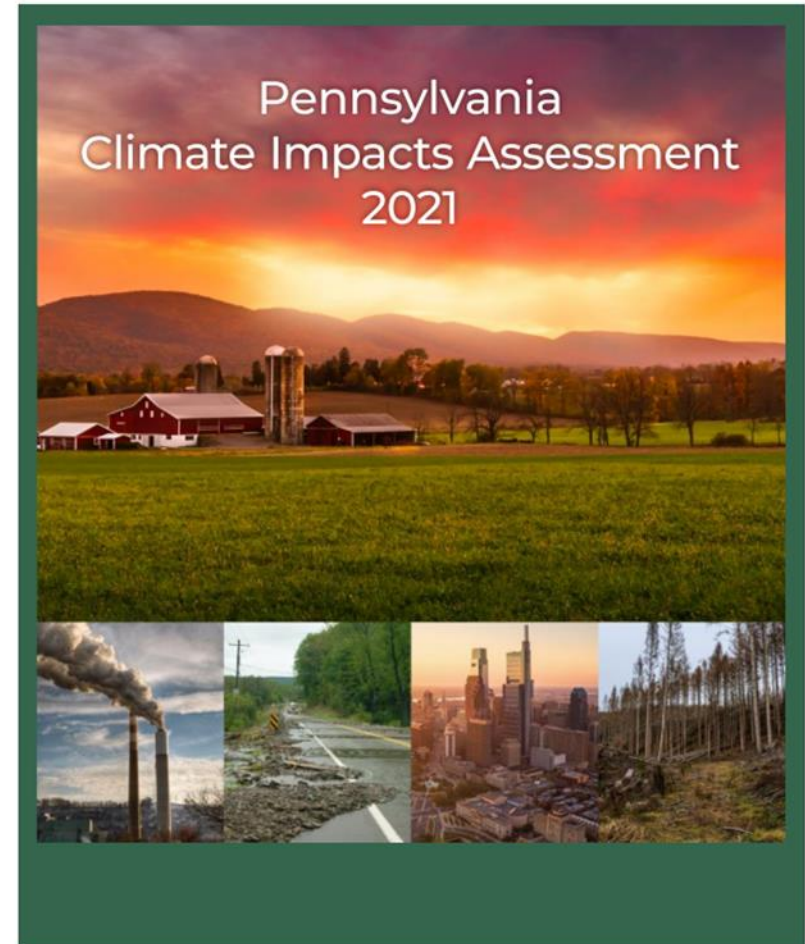
"Preventing Outages and Enhancing the Resilience of the Electric Grid"

Using Infrastructure Investment and Jobs Act Section 40101(d) funding to support supplemental grid-hardening projects to lessen risk and impacts to the grid from disruptive events such as extreme weather

- \$2.5 billion: DOE grants to states and American Indian tribes
- \$2.5 billion: DOE matching grants to industry

▶ Pennsylvania Climate Change Impacts

- Current scientific projections for changes in Pennsylvania's climate and corresponding impacts
- **Impacts will likely affect energy infrastructure**

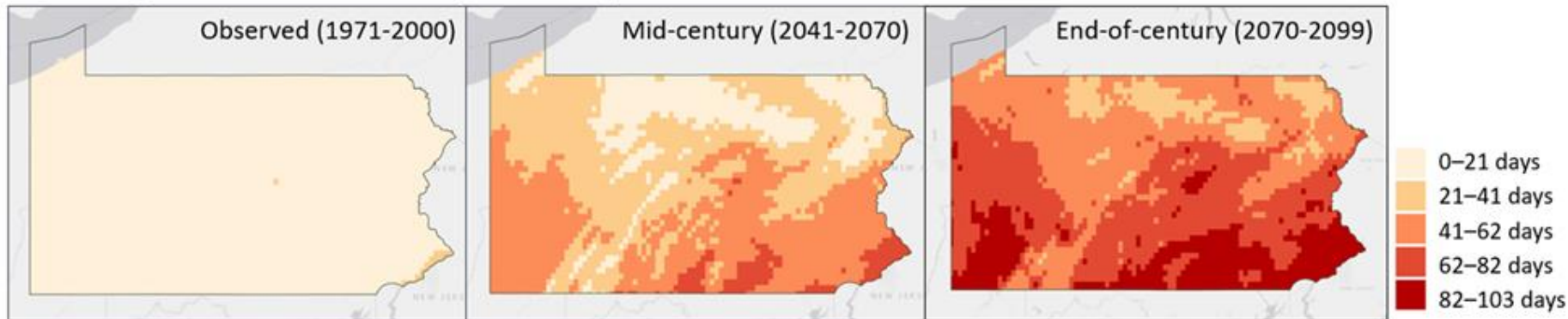


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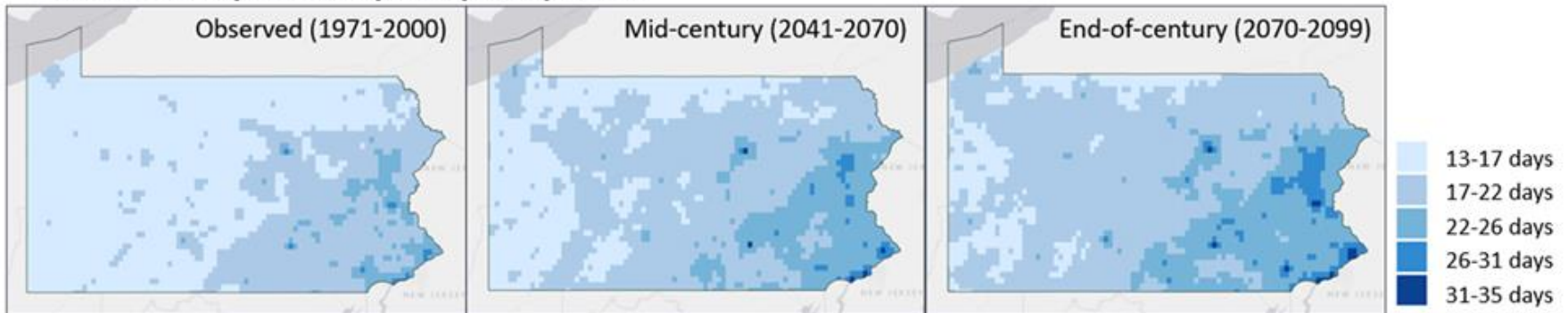


Pennsylvania's Changing Climate

Average Annual Number of Days with Temperatures >90°F



Number of Days with Very Heavy Precipitation



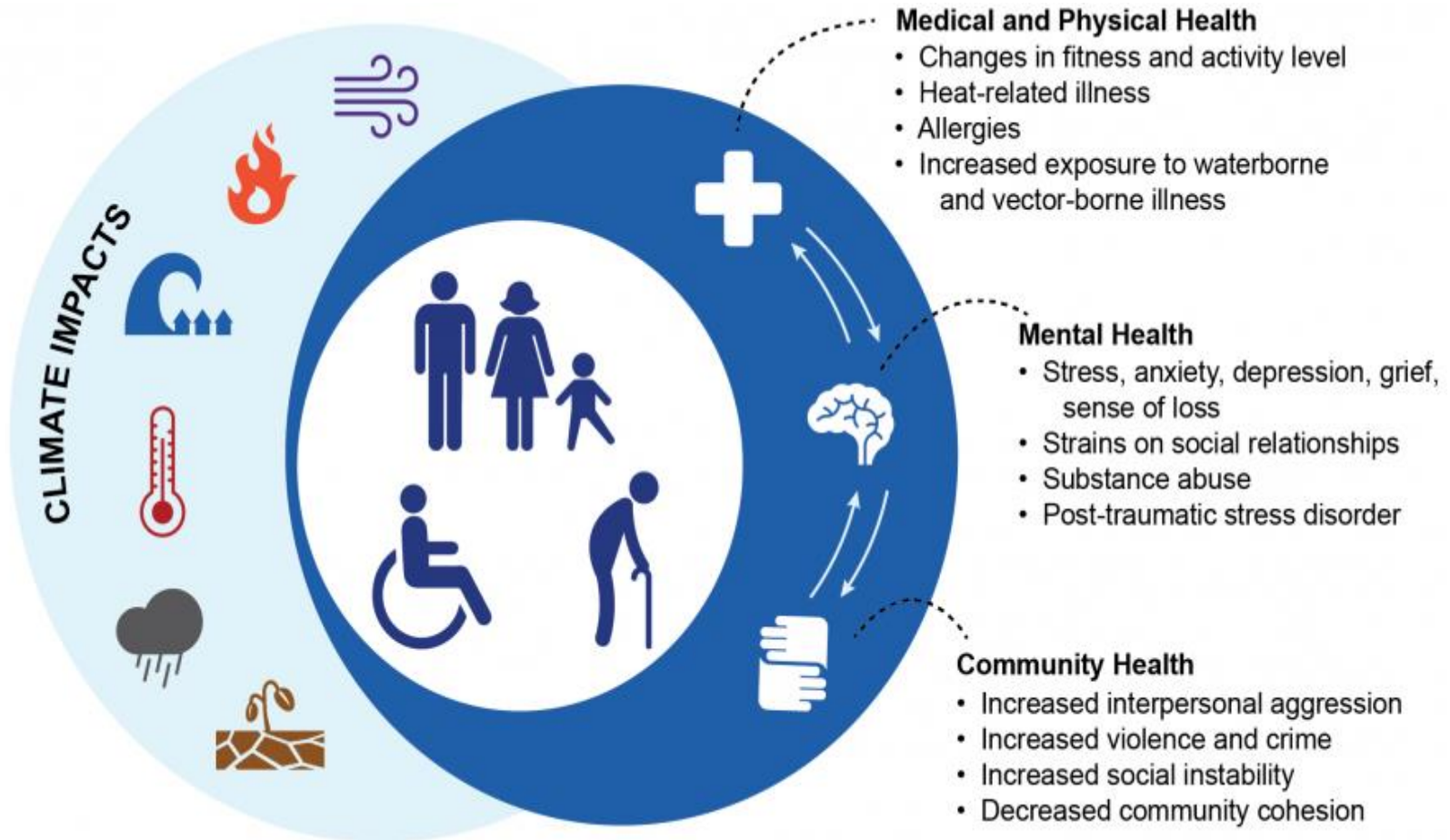
Risk of Climate Change-Related Hazards in Pennsylvania

Climate Hazard	Current Risk Rating	2050 Risk Rating
Increasing average temperatures	Medium (5.3)	High (10.7)
Heavy precipitation and inland flooding	High (9.9)	High (9.9)
Heat waves	Medium (4.7)	High (9.3)
Landslides	Medium (5.6)	Medium (5.6)
Sea level rise	Low (1.9)	Medium (5.6)
Severe tropical and extra-tropical cyclones	Medium (5.3)	Medium (5.3)

Risk Levels to All Parts of Life in PA

Consequence Category Hazard	Human health	Environmental justice and equity	Agriculture	Recreation and tourism	Energy and other economic activity	Forests, ecosystems, and wildlife	Built infrastructure	Overall Risk Rating
Increasing average temperatures	12	12	8	12	8	16	4	10.7
Heavy precipitation and inland flooding	12	8	12	8	8	8	12	9.9
Heat waves	16	12	8	4	8	4	8	9.3
Landslides	3	6	3	3	6	3	12	5.6
Sea level rise	3	3	3	3	6	6	12	5.6
Severe tropical and extra-tropical cyclones	6	4	6	4	4	4	8	5.3

Climate Impacts



State Enhanced Hazard Mitigation Plan

- **Pennsylvania Emergency Management Agency coordinates**
 - Input from many partners; updated every 5 years
- **Takes an all-hazards approach**
 - Natural and human-made hazards, federal guidance, and tested best management practices
- **Vital to identify Pennsylvania's vulnerabilities and increase resilience**
 - Across sectors, including energy infrastructure

Hazards Most Threatening to PA

- Flood
- Winter storm and extreme cold
- Utility interruption
- Hurricane, tropical storm, nor'easter
- Cyber terrorism
- Environmental hazardous materials release
- Dam failure
- Nuclear incident
- Transportation accident
- Wildfire

Hazards to PA Energy Infrastructure

- **Thunderstorm and lightning:** Blown transformers and downed trees may impact power lines, refinery, terminal, or pumping operations
- **Flood:** Damage to equipment exposed to water and debris, including power generation equipment, control center buildings, and transmission lines
- **Extreme heat:** Increased demand for cooling can cause Electric Grid System Operators to operate below reserve margins
- **Drought:** Reduced hydroelectric generation due to low water levels can reduce efficiency at thermoelectric generation facilities
- **Equipment malfunction:** Line arcing, power surges, corrosion, or moisture can cause equipment to malfunction or go offline
- **Pandemic:** Shifts in demand and reduced worker availability

Energy is a Key Lifeline



Hazards and Community Lifelines



Hazards

Hazard	Safety and Security	Food, Water, Shelter	Health and Medical	Energy (Power & Fuel)	Communications	Transportation	Information Networks
Blacks	2	2	2	2	2	2	2
Dam Failure	2	2	2	2	2	2	2
Drone Failure	2	2	2	2	2	2	2
Hurricanes	2	2	2	2	2	2	2
Winter Storm	2	2	2	2	2	2	2
Wildfires	2	2	2	2	2	2	2
Tornado/Wind	2	2	2	2	2	2	2
Coastal Inundation	2	2	2	2	2	2	2
Severe Storms	2	2	2	2	2	2	2
Landslide	2	2	2	2	2	2	2
Subsidence	2	2	2	2	2	2	2
Earthquake	2	2	2	2	2	2	2
Extreme Temperature	2	2	2	2	2	2	2
Drought	2	2	2	2	2	2	2
Building Collapse	2	2	2	2	2	2	2
Infliction	2	2	2	2	2	2	2
Lightning Strike	2	2	2	2	2	2	2
Radiation Exposure	2	2	2	2	2	2	2
Urban Fire/Explosion	2	2	2	2	2	2	2
Cyber Terrorism	2	2	2	2	2	2	2
Terrorism	2	2	2	2	2	2	2
Grid Disturbance	2	2	2	2	2	2	2
Utility Interruption	2	2	2	2	2	2	2
Transportation Accidents	2	2	2	2	2	2	2
Pandemic/Influenza Outbreak	2	2	2	2	2	2	2
Optical Adversity	2	2	2	2	2	2	2
Food/Water Contamination	2	2	2	2	2	2	2
Hazardous Materials	2	2	2	2	2	2	2
Nuclear Incidents	2	2	2	2	2	2	2
Coal Mining	2	2	2	2	2	2	2
Gas/Liquid Pipelines	2	2	2	2	2	2	2
Conventional Oil/Gas Wells	2	2	2	2	2	2	2
Unconventional Wells	2	2	2	2	2	2	2

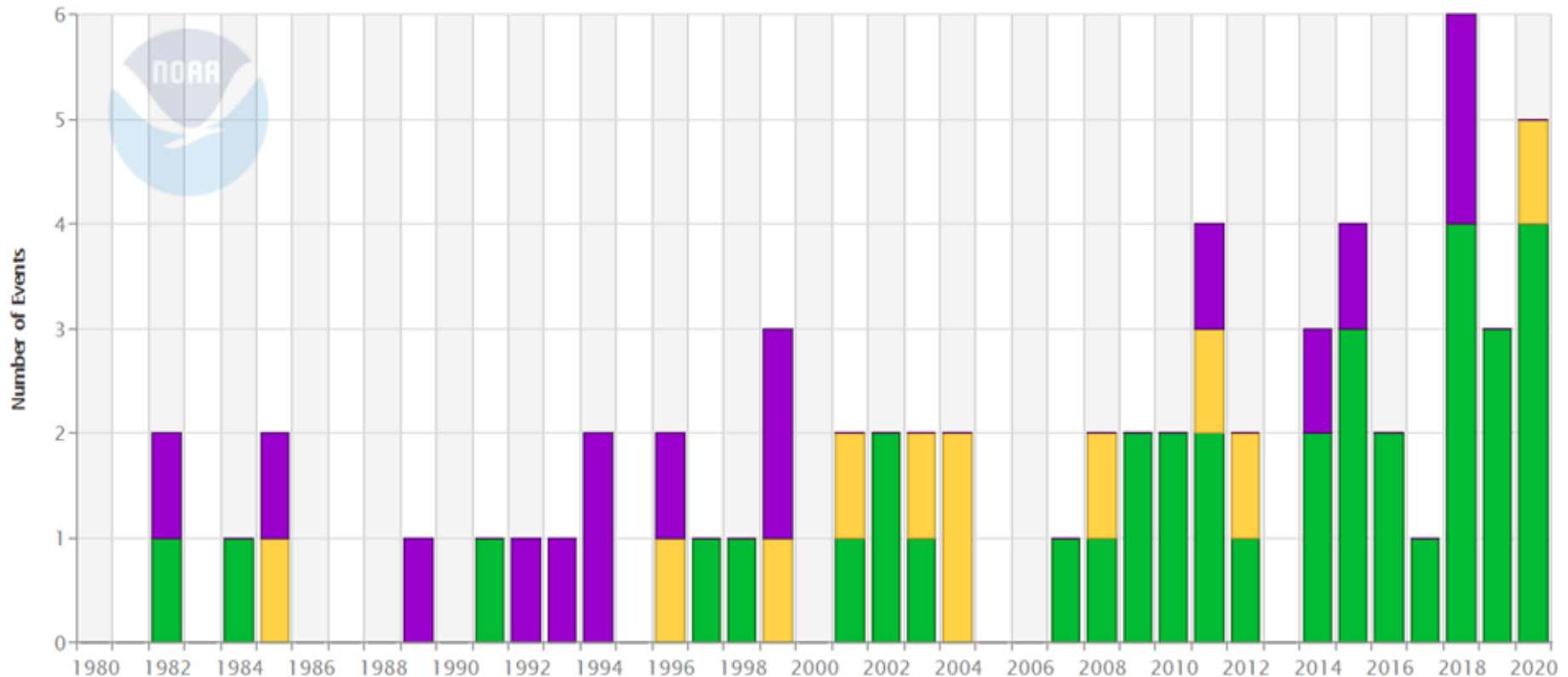
- Working to solidify metrics and rankings, and building scenario models

1 Hazard event could impact the lifeline significantly
 2 Hazard event could impact the lifeline
 3 Hazard event likely will not impact the lifeline

Disasters: Increasing Frequency and Costs

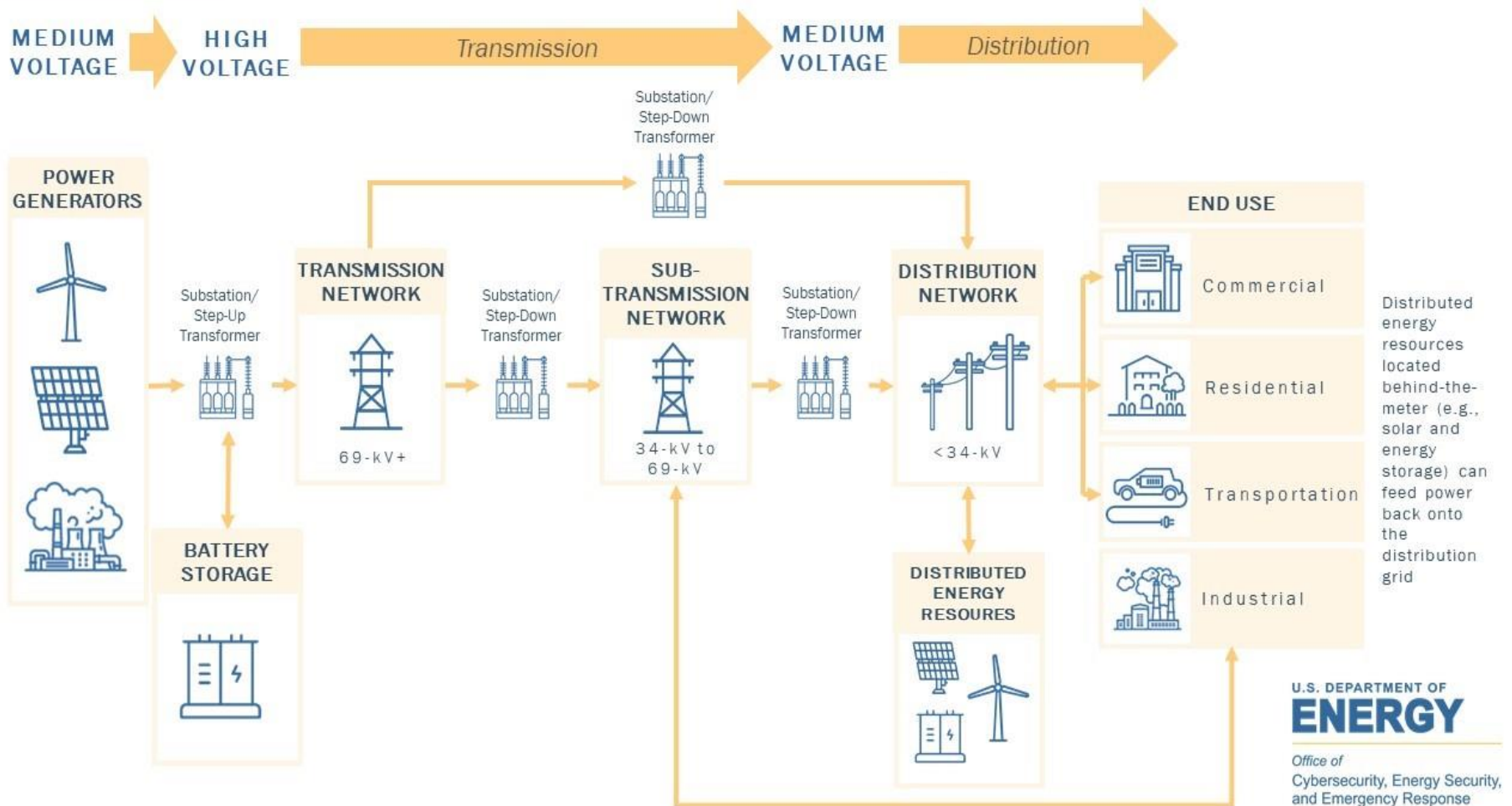
Pennsylvania Billion-Dollar Disaster Events 1980–2020 (CPI-Adjusted)

■ Winter Storm Count ■ Severe Storm Count ■ Tropical Cyclone Count



Parts of the Electric Grid

ELECTRICITY



Pennsylvania 2021 Electrical Outages

Top causes of electrical outages for electric distribution companies were driven primarily by weather events:

- Vegetation (trees): 36.4 percent of outages
- Equipment failure: 22.4 percent of outages

63 reportable outages (impacting 2,500 customers for 6+ consecutive hours):

- Highest number ever recorded by PUC
- All events were driven by severe weather

Electrical Outages

- Pennsylvania expected to have more high-precipitation events and high-heat days in the coming decades (DEP *Pennsylvania Climate Impacts Assessment 2021*).
- The infrastructure for EDCs and other electric distributors will be challenged by: flooding, severe storms, and potentially higher demand on high-heat days.
- Increased rain will also cause vegetation growth and intrusion onto electric utility rights-of-way.
- When upgrading infrastructure, EDCs and other electric distributors should address resiliency to climate and weather challenges.

DOE: Preventing Outages and Enhancing the Resilience of Electric Grid

Coming to Pennsylvania:

- \$8.1 million for Year 1
- Approximately \$40.5 million over 5 years

Additional contributions:

- 15% state cost-share
- Minimum 33% or 100% cost share for subgrantees (percentage of federal funds).

Method and distribution of funds:

- DEP offers a competitive solicitation
- DEP and DOE will approve project subawards

What DOE Funding Could Pay For

- Hardening grid assets to decrease vulnerability to threats
 - Utility pole management
 - Vegetation management
 - Undergrounding electrical equipment
- Real-time control and coordination of system assets, including inverter-based distributed energy resources
 - Monitoring and control technologies
 - Microgrids
 - Battery-storage subcomponents

What DOE Funding Could Pay For

- Tools to support modeling and analysis to help generate solutions to improve all-hazards resilience
 - Adaptive protection technologies
 - Advanced modeling technologies
- Training, recruitment, and retention of properly credentialed workers to perform work
 - Hardening power lines, facilities, substations, etc.
 - Replacing old overhead conductors and underground cables

Who Could Apply for Funding

- Electric grid operators
- Electricity storage operators
- Electricity generators
- Transmission owners or operators
- Distribution providers
- Fuel suppliers
- Any other relevant entities, as determined by the Secretary of DOE

Pennsylvania's Next Steps

Submit to DOE by September 30:

- Year 1 Plan for distribution of funds
 - Specifying criteria and methods to award grants
- Objectives for all-hazards resilience investment decisions

Making Pennsylvania's Electric Grid Stronger: Year 1 Plan

Draft Program Goal

Support projects that will enable grid resiliency for communities, including physical upgrades to critical infrastructure, and deliver environmental and health benefits to Pennsylvanians in low-income and vulnerable communities in both rural and urban areas statewide.

Making Pennsylvania's Electric Grid Stronger: Year 1 Plan

Draft Objectives

1. Protect urban and rural communities from the consequences of disruptive events;
2. Support project(s) that are sited in or primarily benefit PA Justice 40 areas;
3. Improve the health of Pennsylvanians with projects that reduce air emissions/greenhouse gases; and
4. Deploy new grid resiliency projects in addition to those currently planned.

Making Pennsylvania's Electric Grid Stronger: Year 1 Plan

Draft Application Criteria :

- Community outcomes:
 - Achieving energy resilience (near term)
 - Distribution of benefits (reduction in likelihood/consequences of disruptive events, etc.)
 - Significant local support: Engagement and confirmation of local decision-makers
- Decarbonization, environmental, and health benefits
- Risk reduction (long term)
- Workforce development and diverse labor force
- Excellence in project design, match funding and capacity to complete the project



Energy Programs Office



Questions and Discussion

Go to www.menti.com and use the Code: 3492 4901



Please enter the code

Submit

The code is found on the screen in front of you

Making PA's Electric Grid Stronger

- Timeline (best intentions)
 - 9/30/2022: EPO submits application to US DOE, DOE/NETL reviews applications from States & Tribes
 - 60-90 days - DOE approves Plan, and
 - DEP and DOE work on a Project Implementation Plan
 - 4 Qtr. 2022: EPO concurrently develops grant program guidance
 - Early 2023: EPO announces opening of program
 - Spring 2023: EPO begins process of developing Year 2 Plan.
- Final Questions?
- Final Thoughts
 - EPO, PEMA, PAPUC



Energy Programs Office

Thank you!

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