

# Safeguarding Pennsylvania - Resilient Microgrids in Our Communities

Energy Programs Office  
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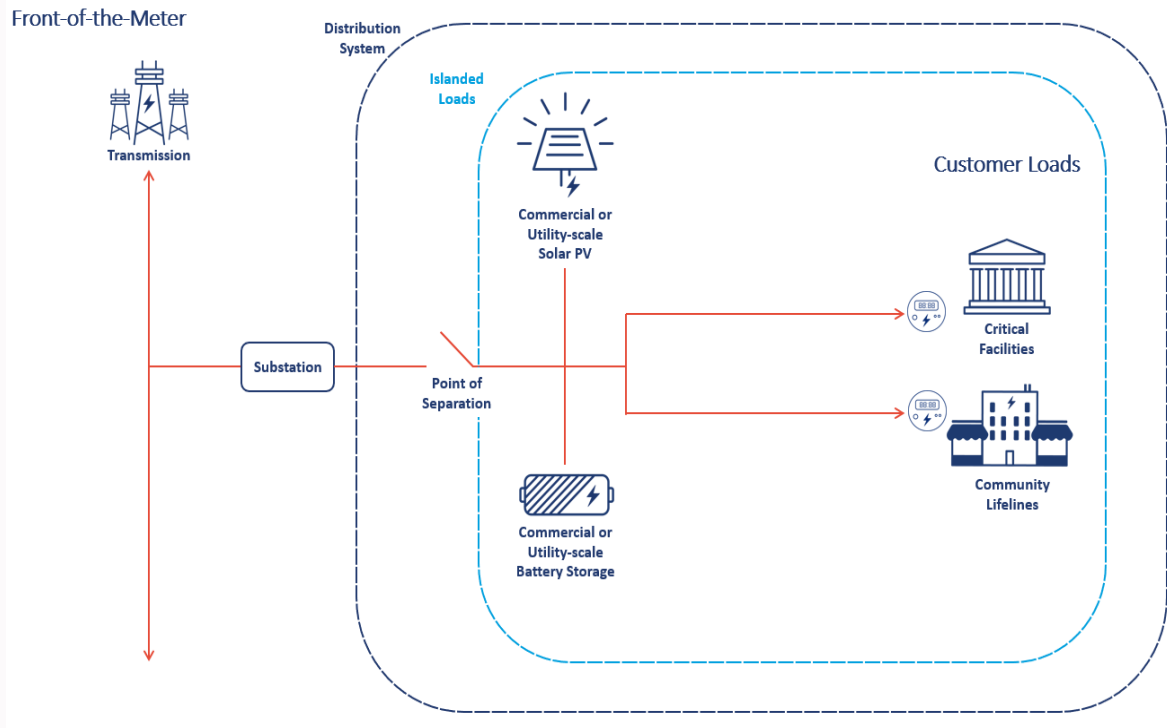


# What is a microgrid?

- A group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that act as a single controllable entity with respect to the grid
- Grid connected mode
- Island mode



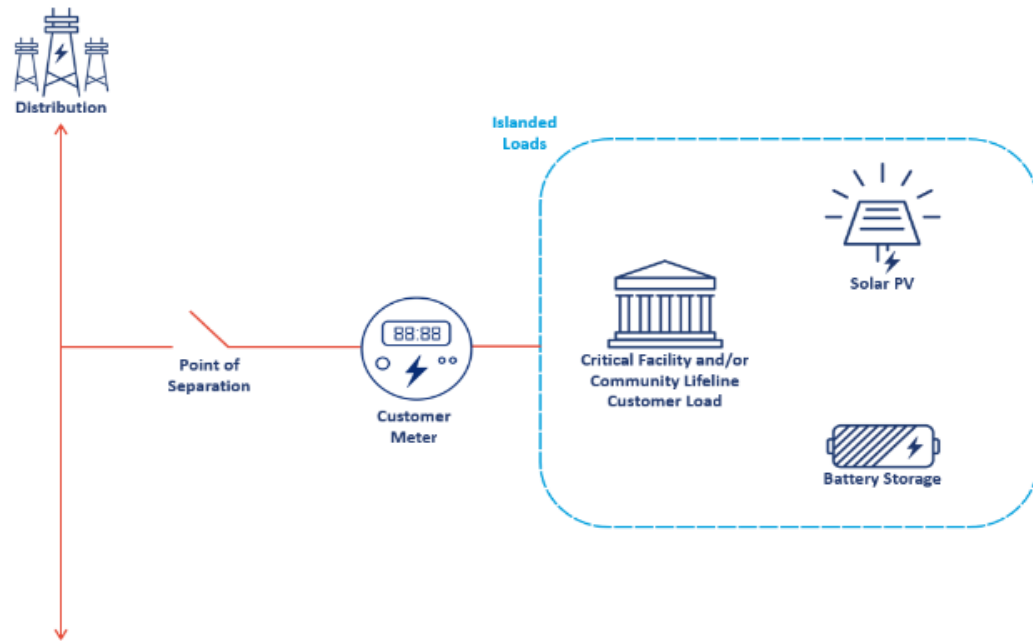
# Front of the Meter (FTM)



- Often referred to as Community Microgrids.
- This set up utilizes a Distributed Energy Resource such as solar PV in conjunction with battery storage and backup generators to support multiple facilities by being in front of all of their meters.
- All of the facilities must be in close proximity to each other
- Is still able to work in conjunction with the grid or island

# Behind the Meter (BTM)

Behind-the-Meter



- This set up utilizes a Distributed Energy Resource such as solar PV in conjunction with battery storage and potentially backup generators to support a single facility, from behind their meter.
- Typically simpler and faster to implement because is only supplying 1 facility
- Is still able to work in conjunction with the grid or island



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# What do microgrids mean for Pennsylvania?

- Resilience: “the ability of the grid, buildings, and communities to withstand and rapidly recover from power outages and continue operating with electricity”
- Reliability: “the ability of a power system to withstand instability, uncontrolled events, cascading failures, or unanticipated loss of system components”
- Energy Diversification: adding additional generation to the grid contributes to the overall energy portfolio in PA
- Cost Savings and Emissions Reduction: On-site renewable generation with energy export options helps manage peak demand and shift energy usage to off-peak hours.

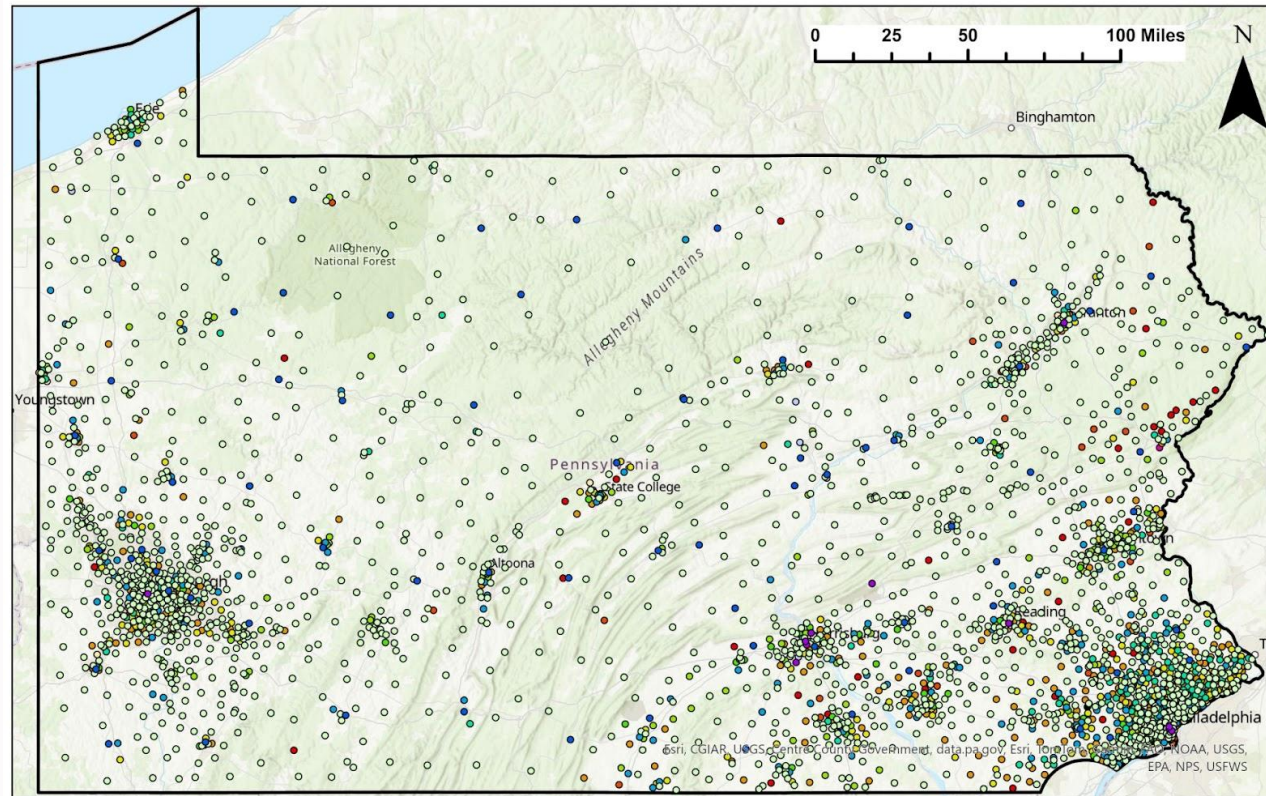


# Where Should They be Sited?

- Utilizing State Energy Program (SEP) Formula Grant, the Energy Programs Office contracted Smart Electric Power Alliance (SEPA) to conduct a study to identify vulnerable critical facilities throughout PA.
- SEPA gathered data from many stakeholders including but not limited to, NREL, PA DEP, The Red Cross, Electric Distribution Companies (EDC) in Pennsylvania, FEMA, and Environmental Justice Maps.
- Established the criteria to identify a targeted facility risk profile
  - Critical Facility- Critical infrastructure types that were determined by state and federal definitions
  - Utility Planning and Operations- looked at reliability metrics, hosting capacity constraints, historical outages
  - Natural Hazards-looked at natural hazard risk scores throughout the state
  - Energy Equity & Environmental Justice- looked at both state and federal EE & EJ maps



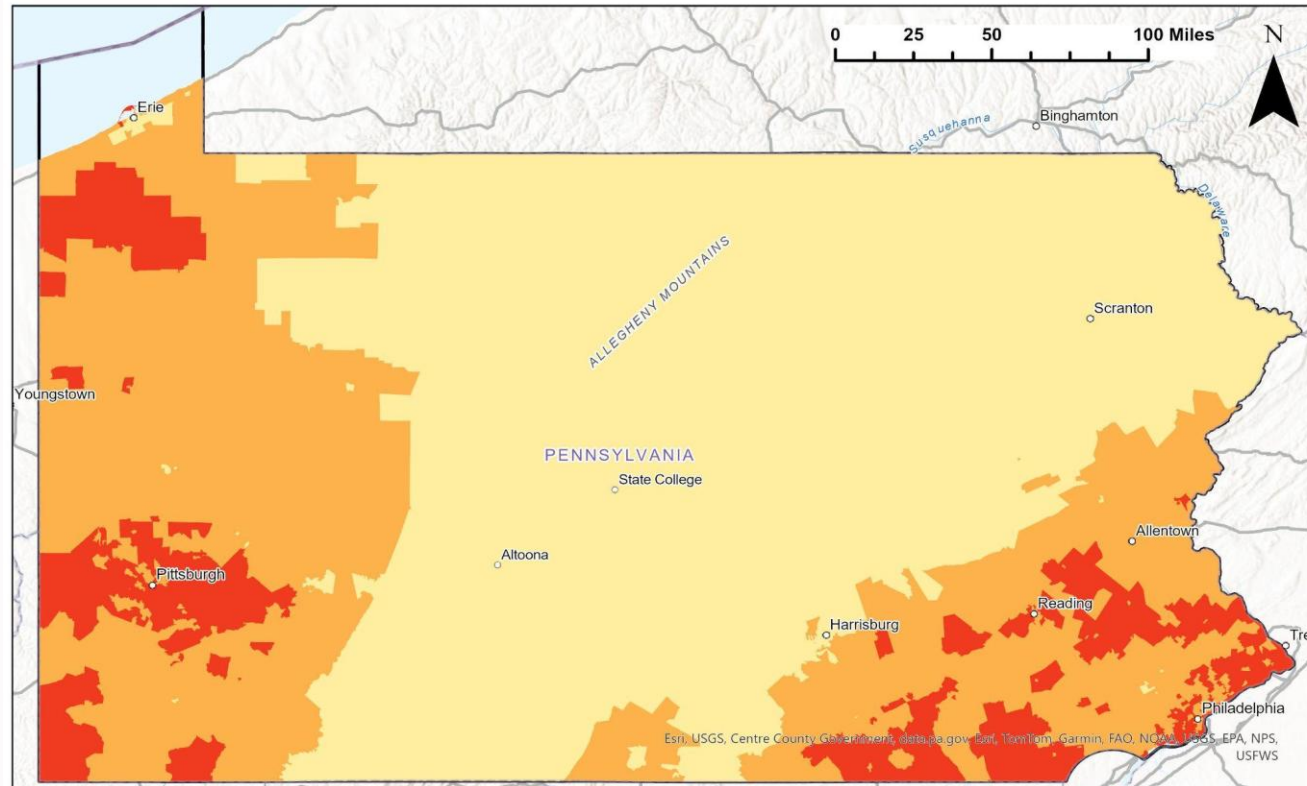
# Critical Facilities



- |                                |   |                             |                  |
|--------------------------------|---|-----------------------------|------------------|
| □ State Outline                | ● Dialysis Centers                      | ● Government Offices        | ● Grocery Stores |
| ● Pharmacies                   | ● Water and Wastewater Treatment Plants | ● Schools (K-12, Private)   | ● Fire Stations  |
| ● Shelters                     | ● Police Stations                       | ● Correctional Facilities   | ● Gas Stations   |
| ● Emergency Operations Centers | ● Urgent Care                           | ● Colleges and Universities | ● Nursing Homes  |
|                                |   | ● Hospitals                 |                  |



# Natural Hazards



State Outline

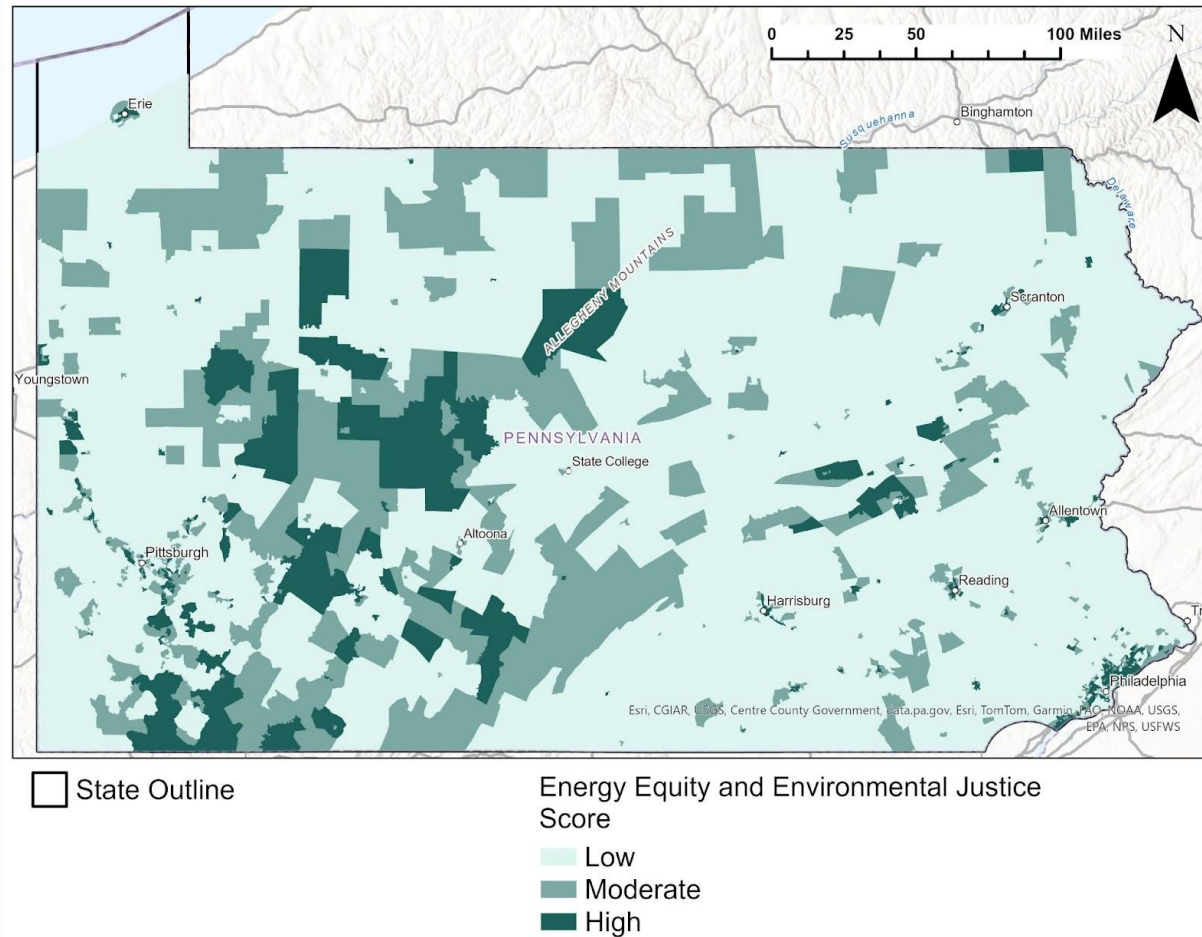
Natural Hazard Risk Score

- Low Risk Area
- Moderate Risk Area
- High Risk Area





# EE & EJ Scores





# Ranking 23,937 Sites

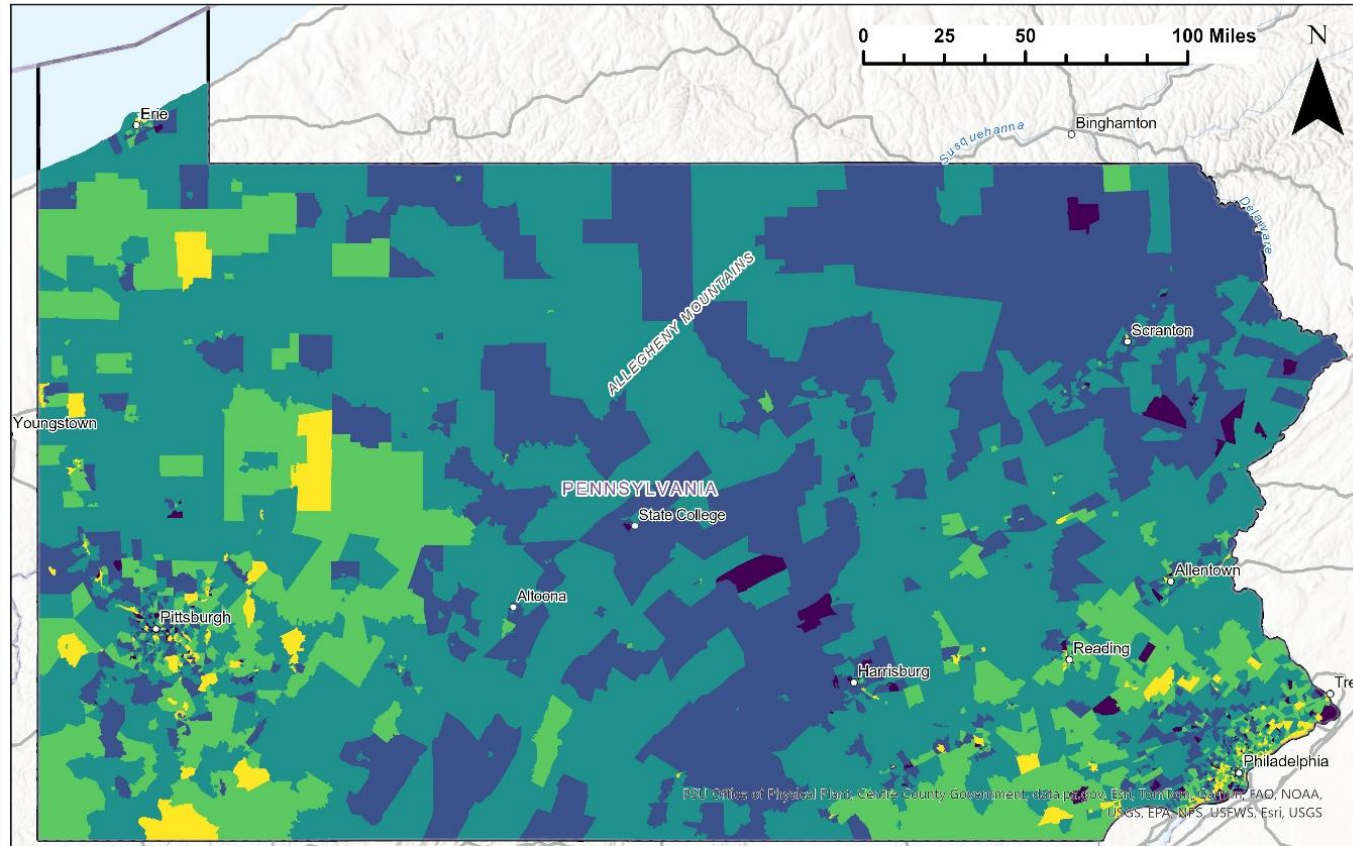


Site Suitability Criteria	Sub Criteria
Critical Infrastructure and Services (Up to 30 points)	<ul style="list-style-type: none"><li>• Criticality of facilities</li><li>• Dual purpose as an emergency shelter</li><li>• Concentration</li></ul>
Utility Planning and Operations (Up to 25 points)	<ul style="list-style-type: none"><li>• Electricity circuit reliability</li><li>• Hosting capacity constraints</li></ul>
Natural Hazards (Up to 20 points)	<ul style="list-style-type: none"><li>• Natural hazard risk</li><li>• FEMA Community Disaster Resilience Zone</li></ul>
Energy Equity and Environmental Justice (Up to 25 points)	<ul style="list-style-type: none"><li>• Environmental Justice Area</li><li>• Disadvantaged Community</li><li>• Energy Burden</li><li>• Energy Community</li><li>• Medicare Beneficiaries</li><li>• Low-Income Community</li><li>• Persistent Poverty</li></ul>



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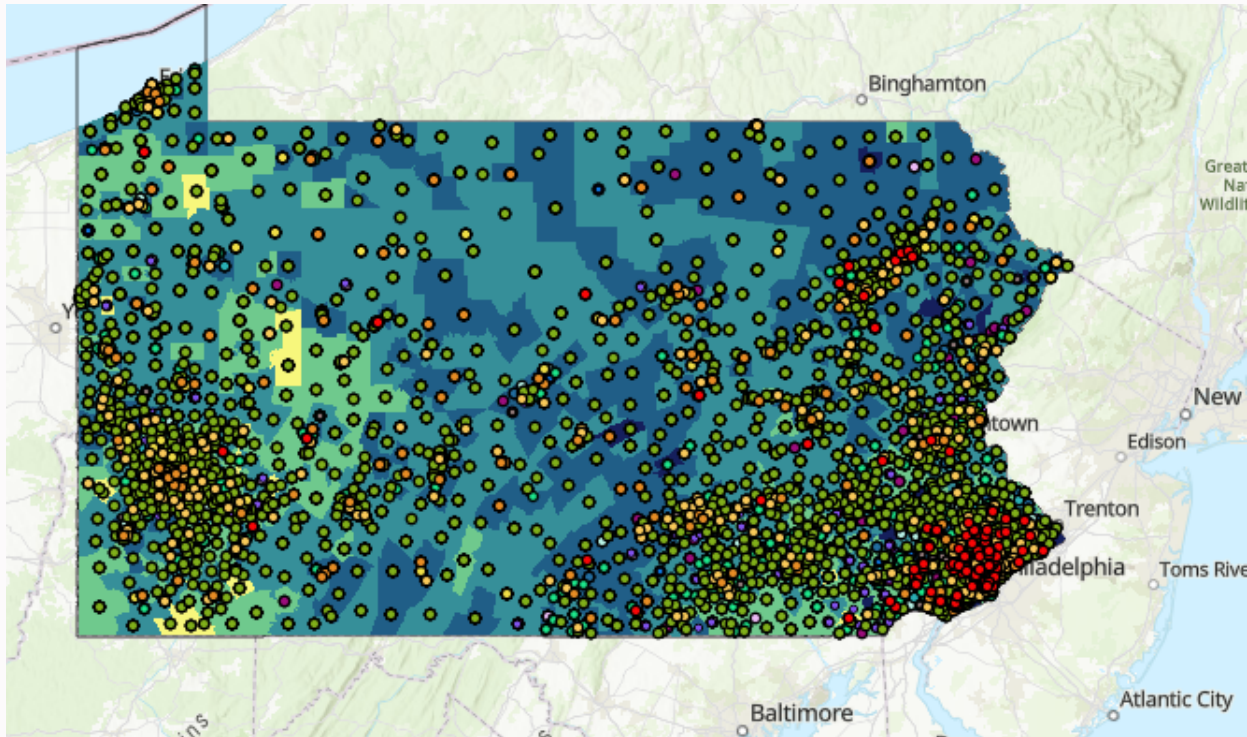
# Aggregated Risk Scores



State Outline

Aggregated Scores

- Lowest Scoring
- Low Scoring
- Medium Scoring
- High Scoring
- Highest Scoring



# Results

- A published study report named Safeguarding Pennsylvania - Resilient Microgrids in Our Communities
- A public facing GIS Mapping tool
- 28 potential FTM microgrid deployment sites were identified for prioritization
- 240 or 1% of critical facilities in PA were identified for BTM microgrid prioritization
- Modeling of 3 conceptual microgrid design scenarios across the critical facility types



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# What's Next?

- Leveraging the study to inform where the greatest resiliency need is throughout the state
- Developing a strategy that targets municipally owned facilities that were identified as critical facilities in the study data
- Creating a plan to utilize the information on the identified facilities to target efforts to help establish microgrids at the most vulnerable critical facilities in Pennsylvania



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# Resources

- <https://www.pa.gov/agencies/dep/programs-and-services/energy-programs-office/energy-assurance-and-resiliency.html>
- [https://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OET/DPortalFiles/EnergyAssurance/Safeguarding Pennsylvania Microgrid Study Final.pdf](https://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OET/DPortalFiles/EnergyAssurance/Safeguarding%20Pennsylvania%20Microgrid%20Study%20Final.pdf)
- <https://sepa-2021.maps.arcgis.com/apps/webappviewer/index.html?id=4c1cf856768e42a1b27c2d6f5ca27a3c>



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# Get In Touch

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The Department of Environmental Protection's mission is to protect Pennsylvania's air, land and water resources and to provide for the health and safety of its residents and visitors, consistent with the rights and duties established under the Environmental Rights Amendment (Article 1, Section 27 of the Pennsylvania Constitution).