



Re-Establishing Critical Utilities

Problem

After a hurricane, flood, or other catastrophic event, the greatest threats to people and businesses come from the inability to resume normal operations. Prompt resumption of communications, emergency services, and basic needs are essential to the region's resilience. Economic hardships are endured if people cannot get to work, and businesses of all sizes face significant costs due to disruptions to operations. There are even threats to public safety if emergency services cannot be contacted to help those in distress. Important institutions such as hospitals, airports and ports are affected. Small businesses such as gas stations, hardware stores and food service providers supply essential services and disruptions to them could result in their going out of business.

After an acute event, vital installations need to be made functional as soon as possible to prevent further degradation in the resilience of a community. Electricity, communications (including data) and water are some of the most important elements that need to be restored after an acute event. Capabilities currently exist that can be installed (permanently) at installations to provide that backup but are expensive to implement and maintain at every installation, particularly when they may not be required. Needed is an integrated unit that may be pre-deployed just prior to the event and readily implemented after an event.

The types and sizes of facilities to be considered in this topic are:

- A 250 bed Level I trauma center hospital
- Stand-alone outpatient facilities
- A major company's data and operations center
- A city block

Critical functionalities include:

- Electricity
- Potable water and wastewater management
- Cell phone communications
- 911 access
- Internet access

Also, interdependencies among networked infrastructure that supports communities – e.g., interconnected water, stormwater, electricity, telecommunications, transportation systems – create a known risk of cascading failure: A disruption in one system may lead to a significant disruption in one or more other systems. For example, during a coastal flooding event the vulnerability of the power grid to flooding can cause cascading failures to telecommunications, transportation, sanitation and other interconnected networks, exponentially raising the consequence of flooding.



What We've Heard

Coastal communities seek innovative solutions to re-establish and maintain functionality of critical systems after an acute event to prevent cascading failures and degradation in the resilience of a community.

Although not meant to be comprehensive, below are suggested areas in need of innovative solutions identified by stakeholders in Hampton Roads and other coastal communities. Submissions do not need to be limited to these areas. However, to be eligible for funding from RISE, entrants **must focus on a Hampton Roads need** while demonstrating the ability to scale to other communities.

- Portable systems deployable within 2 hours of a disruptive event and able to provide 72 hours of continuous functionality to critical services.
- Approaches to allow re-establishing the power supply to residences and businesses city-wide within 72 hours of a storm event.
- "Rainbomb" detection, warning and applications to protecting and/or re-establishing critical utilities.
- Mitigating the risk of cascading failure in interdependencies among networked infrastructure that supports communities.
- Means of protecting the existing grid infrastructure against wind and water damage leading to outages.
- Energy storage, microgrids and other approaches to enhance power supply resilience hyper locally.
- Alternate fuels for back-up power applications. Solutions must be for applications other than single private residences.