Both the government and the private sector are waging an intense battle against COVID-19.

Progress has been made, but new challenges are coming, like peak hurricane season and Public Safety Power Shutoffs that will inevitably cause power outages.

Introducing the Power Resilience Blueprint for America, a bold plan to safeguard emergency power so our fight against COVID-19 can still run at full speed, even when the power goes out.

Power Resilience Blueprint
For America

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Power Resilience Blueprint for America Overview

Imagine if the battle against COVID-19 is further hampered by a widespread loss of electricity. Hospitals, nursing homes and other critical infrastructure would be forced to rely on emergency power … that has itself experienced failures in virtually every disaster, leading to emergency evacuations, and in some cases, patient fatalities.

The Power Resilience Blueprint for America is a bold plan that offers immediate solutions to help America prepare for the complex scenario of COVID-19's continuing spread at a time when peak hurricane season and Public Safety Power Shutoffs in California will significantly increase the likelihood of power outages.

The Power Resilience Blueprint addresses the pandemic's painful lesson of resource scarcity by offering solutions to address the likely shortage of emergency power assets in a future, catastrophic power outage while bringing major new efficiencies to the deployment of temporary emergency power resources.

The Power Resilience Blueprint's eight action steps embody best practices currently being developed and implemented by two 501c3 non-profits that are national leaders in energy resilience: Powered for Patients and the Electric Infrastructure Security Council. These action steps are highlighted in this Overview Document with addtitional detail provided in the appendix.

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Necessary Government Action to Implement Blueprint

- Guidance from DHS, FEMA, HHS and DOE on permissible use of existing grant funds held by states and territories for implementation of Power Resilience Blueprint activities
- Allocation of available and/or future funding by DHS, FEMA, HHS, and DOE
- As needed, appropriation of new funding by Congress directed to DHS, FEMA, HHS and DOE for implementation of the Power Resilience Blueprint
- Active engagement of appropriate federal, state, local, tribal and territorial officials to engage in and support enhanced energy assurance and emergency power preparedness planning initiatives detailed in the Power Resilience Blueprint

Timeline for Implementation

July 2020

- Share Power Resilience Blueprint for America with DHS, FEMA, HHS and DOE and initiate outreach to Congress
- Share Blueprint with elected state leaders and state and local emergency managers, public health officials, energy assurance officials and their respective trade associations

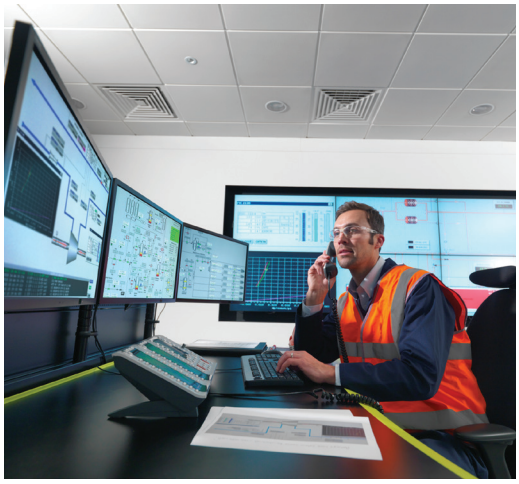
July to August 2020 and Beyond

- As funding becomes available, implement project plan

Detailed Overview of Power Resilience Blueprint for America Action Steps

Blueprint Action Step # 1: Deployment of DHS-Funded P.I.O.N.E.E.R. Tool

Targeted deployment of the DHS-funded P.I.O.N.E.E.R. tool to single-generator hospitals and skilled nursing facilities, especially those treating COVID-19 patients, to provide government officials and utilities with real time alerts when emergency power is threatened during a power outage to enable expedited response.

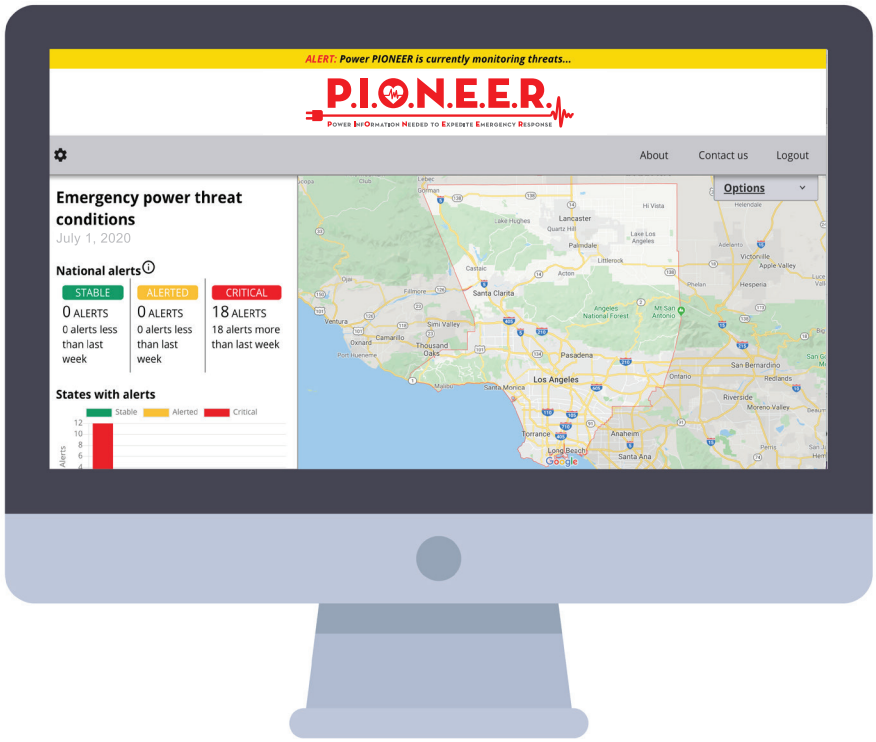


In September 2018, the Department of Homeland Security awarded a Security and Resilience Challenge contract to Powered for Patients to develop the P.I.O.N.E.E.R. tool prototype. The P.I.O.N.E.E.R. tool is a web-based dashboard that provides government agencies and utilities with automated and real time emergency power threat reports from critical facilities whose emergency power systems are monitored by Fault Detection and Diagnostic (FDD) technology.

P.I.O.N.E.E.R. stands for Power Information Needed to Expedite Emergency Response. Hundreds of hospitals in the U.S., and hundreds more critical infrastructure facilities such as water and wastewater treatment plants, data centers, research facilities in national labs and universities and public safety facilities have FDD technology installed on their emergency power systems. The P.I.O.N.E.E.R. tool is also equipped to receive manually submitted, real time threat reports from facilities not currently using Fault Detection and Diagnostic technology on their emergency power system.

Failures of emergency power at hospitals and other critical facilities have occurred in nearly every major disaster in recent decades. The loss of emergency power in a hospital or skilled nursing facility with a single generator treating COVID-19 patients or other patients depending on ventilators would represent a life-threatening emergency. Ventilator patients in these facilities would have to be kept alive by manual operation

of ventilators until emergency or utility power could be restored or until an evacuation of ventilator patients to another facility could be achieved. Deploying the P.I.O.N.E.E.R. tool to these single generator hospitals and nursing homes would give designated emergency managers and public health officials and utilities automated and real time alerts anytime emergency power faces a serious threat. This early warning would enable rapid response by government officials and utilities to support a stricken facility whose ventilator patients, and others dependent on electric-powered medical devices, will face life-threatening consequences if emergency power is lost. In such a scenario, every second will count. P.I.O.N.E.E.R. will also provide ongoing, real time updates on the status of response efforts, keeping officials in the chain of command apprised of efforts to resolve the threat.



It is projected that 16 percent of U.S. hospitals rely on a single generator for their emergency power system[1] and approximately 9 percent of skilled nursing facilities are licensed to provide ventilator care, most of which also rely on a single generator for their emergency power system. Based on these projections, it is estimated that there are approximately 980 single-generator hospitals and 1395 single-generator skilled nursing facilities that treat ventilator patients across the U.S. Among the 980 single-generator hospitals, it is estimated that just over 200 of them are rural hospitals, officially described as Critical Access Hospitals. Given the remoteness of these facilities, they are at even higher risk for emergency power failures that could be difficult to quickly resolve during the battle against COVID-19 and thus should be prioritized for deployment of the P.I.O.N.E.E.R. tool.

The initial, post-prototype version of the P.I.O.N.E.E.R. tool is now ready for immediate deployment to the nation's hospitals and skilled nursing facilities that rely on a single generator and are licensed to provide ventilator care.

The Power Resilience Blueprint's Budget Overview, located in the appendix, details funding requirements associated with different levels of P.I.O.N.E.E.R. deployment.

[1]This estimate is based on the actual number of hospitals in Los Angeles County participating in the HHS Hospital Preparedness Program that operate with a single generator emergency power system. The estimate that 9% of skilled nursing facilities are licensed to provide ventilator care is based on the actual number of such facilities in California, which has 1200 skilled nursing facilities, 100 of which are designated as sub-acute skilled nursing facilities, the designation used in California to indicate a facility's capacity to provide ventilator care.

Blueprint Action Step # 2: Protecting the Medical Supply Chain

Rapid assessment of emergency power gaps at the nation's medical supply chain facilities deemed most critical by HHS/ASPR, development of recommendations to close gaps and deployment of the P.I.O.N.E.E.R. tool to any of these facilities with single-generator emergency power systems.

The job of getting vital medical supplies to the hospitals treating COVID-19 patients requires a resilient supply chain. Warehouses distributing PPE and ventilators must maintain electrical power when the grid fails and many medicines require consistent refrigeration. These realities underscore the importance of reliable emergency power for the nation's most important medical distribution facilities.

The proposed rapid assessment of emergency power gaps at the medical supply facilities deemed most critical by HHS/ASPR will enable development of a plan to close gaps. In addition, this assessment will identify the vitally important facilities that rely on a single generator for their emergency power system, making them ideal candidates for deployment of the P.I.O.N.E.E.R. tool.

Blueprint Action Step # 3: Expanded Deployment of P.I.O.N.E.E.R. Tool

Deploying the P.I.O.N.E.E.R. tool to critical infrastructure beyond the healthcare sector that relies on a single generator.

While the Power Resilience Blueprint addresses COVID-related concerns about emergency power vulnerability in critical healthcare facilities, the Blueprint is focused on emergency power preparedness across all critical infrastructure sectors. As such, it is recommended that the P.I.O.N.E.E.R. tool be deployed to monitor single generator emergency power systems in facilities such as water and wastewater treatment plants, 911 call centers and vital public safety facilities. After all, a hospital without potable water or functioning wastewater treatment is as compromised as one without power. Further, water and wastewater failures many necessitate unplanned evacuations of areas by citizens, not just those in healthcare facilities.

The identification of these facilities should be done through coordinated effort with state, county and local emergency managers and public health officials. These deployments could be limited in number and considered as pilot initiatives in targeted states, augmenting the deployments at single generator hospitals and skilled nursing facilities in each pilot state. Such deployments would help pilot states enhance their understanding of the unique emergency power needs of each critical infrastructure sector and better prepare that state's officials to make difficult decisions about allocation of emergency power assets across all sectors in a disaster, especially when these resources are scarce.

Prioritization Considerations for Deployment of DHS-Funded P.I.O.N.E.E.R. Tool

Action Steps 1, 2 and 3 each call for deployment of the P.I.O.N.E.E.R. tool for different types of critical facilities. Recognizing that resources are limited, prioritization considerations for deployment of the P.I.O.N.E.E.R. tool could include:

- All 216 Critical Access Hospitals (CAH) relying on a single generator[2]
- A percentage of the most critical healthcare/medical distribution facilities as identified by HHS/ASPR that rely on single generator emergency power systems
- A percentage of the single generator hospitals and SNFs across the country relying on a single generator (could consider targeting the 10 states with the highest COVID-19 death rates on a per capita basis, or the 10 most populous states.)
- Pilot State Deployments to non-healthcare critical infrastructure facilities with single generator emergency power systems (It is recommended that these deployments be made in states where single generator hospitals and skilled nursing facilities are slated for P.I.O.N.E.E.R. deployment and that a minimum of 25 deployments across all types of critical infrastructure occur in each state. Priority should be given to water, wastewater, communications, fuel distribution, transportation, and emergency management.)

One-time deployment costs for the Power P.I.O.N.E.E.R. tool are as follows based on the total number of deployments funded as part of the Power Resilience Blueprint.

- Initial 250 sites (anywhere in the continental United States).....$3,000
- Next 250 sites (anywhere in the continental United States) $2.500
- Beyond 500 sites (CONUS and OCONUS deployments) $2,000

In addition to the one-time equipment installation expense, an annual fee of $275 is charged for each facility for periodic testing, software updates, and technical support.

Detailed cost estimates for various P.I.O.N.E.E.R. deployment scenarios are outlined in the Power Resilience Blueprint Budget Overview included in the appendix.

[2]There are 1350 CAH Hospitals in the U.S. An estimated 16% of them – or 216 – have only single generators (see ref 1).

Blueprint Action Step # 4: Expand FEMA's Temporary Emergency Power Task Force

Expand the mission of FEMA's Temporary Emergency Power Task Force to serve as a coordination mechanism at the highest levels of federal government and industry to formalize public-private partnership to enhance supply chain coordination.

FEMA
Temporary Emergency Power Task Force

Experts agree that a shortage of emergency power resources in a catastrophic power outage in the U.S. is largely unavoidable. What can be avoided is the chaos of facing such a shortage ill-prepared.

A shortage of emergency power assets is not a far-fetched notion. FEMA and the U.S. Army Corps of Engineers (USACE) discovered this reality when responding to Hurricane Maria in 2017. These two federal agencies jointly manage the nation's largest fleet of temporary generators. In addition to nearly 1,000 generators owned by FEMA, the fleet is augmented by hundreds of generators rented by the Defense Logistics Agency (DLA).

At the peak of the Hurricane Maria response, the sheer number of requests for generators in Puerto Rico pushed the federal fleet, including its private-rental assets, beyond its limits. Desperate requests for emergency power support from health clinics, gas stations, grocery stores and other essential facilities could not be fulfilled.

In a widespread and prolonged power outage, would hospitals with neonatal ICUs be prioritized over a nursing facility serving elderly patients? Would officials deploy a generator and fuel to a water treatment plant that supplies drinking water to tens of thousands or a 911 call center serving that same population?

Such painful decisions will fall largely on governors who will turn to their emergency management and public health leaders for guidance in what will likely be life or death decisions. (Action Step # 7 will provide a tool to help support this decision making.)

FEMA launched its Temporary Emergency Power Task Force following Hurricane Maria to help the agency better prepare for future shortages of temporary emergency power assets. Key tasks relative to expanding the mission of the Task Force include:

- Liaise with FEMA to debrief on FEMA's Temporary Emergency Power Task Force and determine key unmet needs from existing Task Force. Expand the Task Force mission to address unmet needs, including enhancing readiness for emergency power resource scarcity to include fuel scarcity.

- Recruitment of key private sector leaders involved in the manufacturing, distribution and rental of emergency power equipment to engage these industry leaders in the work of the Temporary Emergency Power Task Force. As part of this process, seek input on how to best align the Emergency Power Task Force's work with industry's disaster planning and response systems.

- Liaise with existing FEMA contractors working with emergency power service providers across the nation to integrate service providers into the work of the Task Force.

- Engage leaders that have worked on fuel scarcity planning from DOE, DLA and other agencies, along with private sector leaders, to facilitate stepped up public and private sector coordination around fuel scarcity

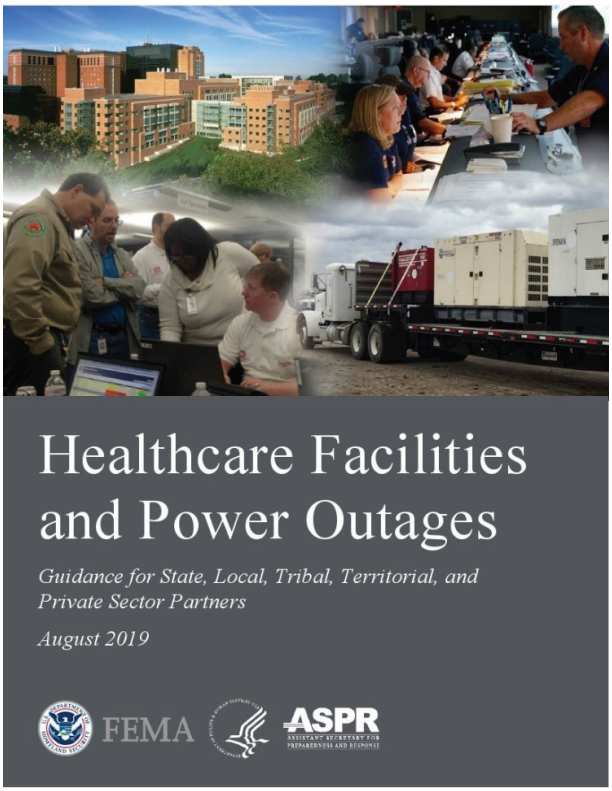
- Develop a Strategy Document and Action Plan for expansion of the Temporary Emergency Power Task Force to achieve desired level of public-private sector coordination before, during and after disasters. This Strategy Document and Action Plan will be driven by the goals of enabling effective public-private sector coordination to address emergency power and fuel shortages in a large-scale disaster and accelerating expanded manufacturing of emergency power system components.

- Seek input on Action Plan from public and private sector stakeholders

- Finalize Action Plan (See appendix for deliverables currently envisioned for Action Plan)

Blueprint Action Step # 5: Create Energy Assurance and Emergency Power Resilience Toolkit

Develop a federal Energy Assurance and Emergency Power Resilience Toolkit and provide additional technical assistance to support energy assurance and emergency power preparedness planning by states and local communities.



The emergency power resilience work of Powered for Patients in Los Angeles County, the organization's recent work authoring an emergency power resilience toolkit for FEMA targeting the healthcare sector, and the energy assurance work of the EIS Council in Kentucky make the two organizations well qualified to develop the proposed Energy Assurance and Emergency Power Resilience Toolkit. This resource can be used by public and private sector leaders to enhance energy assurance preparedness across all sectors of critical infrastructure.

The proposed Toolkit will include key elements of the energy assurance project being advanced by the Electric Infrastructure Security Council with the State of Kentucky. This project is built around a ten-point energy assurance planning approach developed by the U.S. Department of Energy and includes the following three distinct phases:

- ***Phase I*** – High level review of a jurisdiction's energy sources and the logistics surrounding energy production, distribution, shipping, etc.

- ***Phase II*** – Using FEMA's Threat and Hazard Identification and Risk Assessment (THIRA) process as a planning guide, the Toolkit helps a jurisdiction understand its natural hazard risks and estimate capacity requirements to mitigate these risks. The THIRA approach helps a jurisdiction assess how threats impact public and private sector entities and provides a planning approach to identify private sector solutions that can augment public efforts to mitigate hazards.

- ***Phase III*** - Using EIS Council's Black Sky Exercise as a model, instructions for implementing a customized exercise would be provided. This will help the jurisdiction assess how its energy assurance work and its THIRA process prepare the jurisdiction to address challenges posed by the Black Sky scenario that produces a widespread and prolonged power outage. This process identifies preparedness gaps that remain and helps the jurisdiction determine where additional preparedness work is needed to become better equipped to address a power outage or other energy disruptions.

The proposed Toolkit's elements on Emergency Power Resilience Planning will draw heavily on the recently authored FEMA Toolkit and the Powered for Patients Los Angeles County Emergency Power Resilience Initiative. This section of the Toolkit will include instructional details on the following activities:

- Assessing protocols around how threats to emergency power at critical facilities are currently addressed and implementing new protocols to close gaps and enhance response capabilities, including adoption of an early warning and status update protocol to include use of the DHS-funded P.I.O.N.E.E.R. tool

- Identifying the most critical facilities that depend on emergency power to help support prioritized deployment of temporary power assets during a large scale disaster (hospitals, sub-acute skilled nursing facilities (those with ventilator patients), water systems, waste water treatment plants, 911 call centers, fire stations, etc.)

- With critical facilities identified, conducting a survey of their emergency power systems to identify the technical details necessary to facilitate rapid deployment of replacement generators to include number of generators and important technical information about each generator will be important. During survey process, gather additional information about emergency power systems to inform a vulnerability assessment of at-risk systems, i.e., single generator systems, age of emergency power system components, recent history of mechanical problems, etc.

- Conducting an inventory of non-federal temporary power assets

- Reviewing current protocols used for requesting deployment of non-federal temporary power assets and assessing the logistics around actual deployment and installation of these assets

- Stepping up coordination with utilities around collective response in addressing a threat to emergency power at a critical facility during an outage

- Launching state-based Emergency Power Working Groups to facilitate a public private partnership between government and emergency power service, fuel and rental providers to enhance pre-disaster planning and joint disaster response capabilities (This activity will be supported by Action Step # 4 (Expanding Mission of FEMA's Temporary Emergency Power Task Force).

To leverage the impact of the Toolkit, the Power Resilience Blueprint calls for the development of webinars and video tutorials to assist jurisdictions in using the Toolkit to bolster energy assurance and emergency power resilience planning.

In addition, the Power Resilience Blueprint recommends deployment of subject matter experts from Powered for Patients and the EIS Council to assist states in launching Energy Assurance and Emergency Power Resilience Initiatives. If resources prevent a broader deployment of SMEs, suggested initial target states include California, Texas, Florida and New York, the nation's four most populous states. The inclusion of California as a target state would leverage the benefits of the ongoing emergency power resilience initiative launched by the Los Angeles County Emergency Medical Services (EMS) Agency with Powered for Patients in 2019. Phase I of this ongoing initiative is nearly complete and provides an excellent foundation for much of the content envisioned for the Toolkit. As SMEs deploy to initial states to assist in implementation of the Toolkit, valuable lessons learned can be quickly chronicled and disseminated as addendums to the Toolkit for use in other states.

Blueprint Action Step # 6: Enhancing Critical Infrastructure Protection

Launch stepped up emergency power preparedness planning across critical infrastructure sectors through engagement with industry leaders and their trade associations.

In addition to state-focused initiatives, the Power Resilience Blueprint calls for critical infrastructure sector initiatives launched on a national basis to help boost emergency power resilience planning. The principal architects of the Power Resilience Blueprint, Powered for Patients and the Electric Infrastructure Security Council, would launch these partnerships with leading entities in key sectors to drive enhanced emergency power resilience planning and adoption of best practices. The Board of Directors of Powered for Patients recently voted to create a sister non-profit, The Power Alliance, that will address emergency power preparedness planning in non-healthcare sectors of critical infrastructure. The Power Alliance would work closely with Powered for Patients and the EIS Council in implementing this deliverable.

Suggested sectors to engage in partnerships include:

- Healthcare Sector
- Water and Wastewater Industry
- Public Safety Facilities (Police and Fire Stations, 911 Call centers)
- Retail Trade Associations representing food, medicine/pharmaceuticals and fuel
- Data centers supporting critical functions such as cell phone service and internet communications

Proposed tools and activities to help support industry focused engagement:

- Industry Specific Toolkits to support enhanced emergency power resilience planning
- Webinars
- Presentations and panel discussions at key industry conferences

Blueprint Action Step # 7: Creating a Framework to Help Governors Make Life or Death Rationing Decisions When Emergency Power Resource are Scarce

Creation of emergency power rationing guidelines to help governors and local officials make difficult decisions about allocation of limited emergency power assets across all critical infrastructure sectors.

The COVID-19 pandemic focused a great deal of attention on potential ventilator shortages in the U.S. and how hospitals and physicians would address such shortages. Public health leaders and hospital ethicists quickly helped update Standard of Care Documents to address rationing of ventilators[3].

No such framework is believed to exist for how governors or federal officials would make the difficult decisions about emergency power rationing across all sectors of critical infrastructure. The creation of Emergency Power Rationing Guidelines would help close this gap. The guidelines would address both rationing of fuel and emergency power equipment since an emergency power system cannot operate without fuel.

Key elements of this initiative include:

- Identifying appropriate stakeholders to seek their input to help inform guidelines such as technical experts, ethicists, and critical infrastructure sector representatives
- Developing an initial framework for rationing guidelines to include:
    - Identification of types of critical infrastructure to receive rationed assets
    - Guidance to help governors and local officials understand the decisions they will be forced to make about rationing emergency power resources and how these decisions will impact the lives of citizens
    - Establishing trigger points to help state officials understand when rationing will become necessary and the degree of rationing that may be needed

[3] For example, Doctor Daniel Wikler, the Mary B. Saltonstall Professor of Ethics and Population Health at the Harvard T.H. Chan School of Public Health, published an op-ed in the Washington Post on April 1, 2020 that detailed the work he and other medical professionals have undertaken in recent decades to develop frameworks to help guide the rationing of life-sustaining medical resources.

Blueprint Action Step # 8: Developing a Long-Range Plan to Boost America's Power Resilience

Develop a long-range plan to boost America's energy resilience and emergency power preparedness that includes creation of enhanced standards to guide states in achieving significantly higher levels of emergency power preparedness.

Many of the Blueprint's action items will be implemented in the near term and extend over a relatively brief 12 to 18-month period. Yet, the work of boosting America's emergency power preparedness cannot focus just on the threat of COVID-19. Other disasters, including those of potentially greater magnitude, will threaten in the years to come, requiring a sustained effort over many years and decades to ensure enhanced readiness.

The proposed long-range plan will establish ambitious but achievable goals that states can use to guide their work in boosting emergency power preparedness. Implementation of the following actions, in varying degrees, can become the basis for a state achieving different levels of "enhanced" emergency power preparedness.

Few states, counties or large cities have undertaken all of the actions detailed below but several have launched significant initiatives that make them leaders in emergency power resilience and put them on a course to become role models for the rest of the nation.

Recommended actions to boost a jurisdiction's emergency power preparedness:

- Develop a comprehensive Emergency Power Threat Reporting and Response Protocol that includes Early Warning and Status Updates

- Creation of Emergency Power Asset Inventory of non-Federal Assets

- Develop an Emergency Power Asset Mutual Aid Protocol

- Identification of Emergency Power Assets at Critical Infrastructure Facilities

- Create an Emergency Power System Risk Calculation for individual critical infrastructure facilities

- Investment in quick connect devices to enable rapid connection of temporary emergency power assets to critical infrastructure facilities

- Registration of critical infrastructure facilities' emergency power systems in the FEMA Emergency Power Facility Assessment Tool (EPFAT) database

- Stepped Up Coordination with Electric Utilities to develop enhanced communications and response protocols when emergency power is threatened at a critical infrastructure facility during an outage

- Creation an Emergency Power Industry Working Group

- Identification of emergency power gaps in fuel distribution facilities

NOTE: Additional detail on these ten recommended actions a jurisdiction can take to significantly boost its emergency power preparedness can be incorporated into the proposed Energy Assurance and Emergency Power Preparedness Toolkit detailed in Action Step # 5. Further detail on these ten recommended actions is included in the appendix.

Appendix

Details on Implementing FEMA's Temporary Emergency Power Task Force Action Plan *A1*

Details on Recommended Actions to Boost a Jurisdiction's Emergency Power Preparedness for inclusion in Proposed Toolkit *A2*

Key Architects of the Power Resilience Blueprint *A5*

Budget Overview for Power Resilience Blueprint *A7*

State Specific P.I.O.N.E.E.R. Tool Deployment Options and Associated Costs *A9*

Expected Deliverables in FEMA's Temporary Emergency Power Task Force Action Plan

- Create a national, secure inventory of public and private sector temporary and deployable emergency power assets and facilitate coordinated supply chain monitoring and management before, during and after a crisis

- Identify potential shortages of key parts and critical, long lead spare parts to enable pro-active stockpiling of critical assets and supplies

- Identify critical components in the fuel distribution system where the lack of emergency power or other obstacles could seriously impede the ability to keep emergency power refueled in disaster impacted areas. These include:

    - Refineries required to support the current "just in time" inventory management systems that characterize ultra-low sulfur diesel fuel and other emergency generator liquid fuels;

    - Fuel depots and distribution facilities, including electricity- dependent IT systems for coordinating deliveries, pumping infrastructure, etc.

    - Trucking companies and the road infrastructure on which they rely (gasoline/diesel pumps, traffic lights and critical systems for traffic management)

    - Natural gas pipeline pumping stations that rely on electricity

- Develop a report detailing recommended deployments of emergency power or quick connect devices to ensure that critical components of the fuel distribution system can continue to function during a long term and widespread power outage. Report should include recommendations to spur enhanced public-private sector coordination and should detail suggested regulatory, legislative or code changes needed to effectuate recommendations.

- Plan and schedule periodic exercises to ensure the readiness of the public-private sector Temporary Emergency Power Task Force to achieve necessary level of coordination during a catastrophic disaster for both emergency power system equipment and fuel

Details on Recommended Actions to Boost a Jurisdiction's Emergency Power Preparedness for inclusion in Toolkit

Develop a comprehensive Emergency Power Threat Reporting and Response Protocol that includes Early Warning and Status Updates – Jurisdictions adopting such a protocol would provide much-needed clarity around how threats to emergency power at critical infrastructure facilities during power outages should be reported to government and utility officials. This protocol will also clarify how requests for deployment of temporary power and prioritized power restoration should be made by facilities and addressed by government and utilities. It is likely that emergency power threats at different types of facilities would need to be directed to different government officials, i.e., a water treatment plant threat vs a threat at a hospital. This reality makes it that much more important to create an early warning protocol that establishes clear communications protocols for different types of facilities. Deployment of the P.I.O.N.E.E.R. Tool to critical infrastructure facilities is an ideal means of achieving automated, real time notification of government officials and utilities when emergency power is threatened.

Creation of Emergency Power Asset Inventory of non-Federal Assets – In some jurisdictions, there are a significant number of deployable generators owned or rented by state, county or local governments that can be deployed to assist a critical facility during an outage. Some electric utilities also have access to rental generators than can be provided to local emergency management agencies for deployment when needed. Los Angeles County is an example of one such jurisdiction that has the benefit of significant local and county-owned generators as well as rental generators that Southern California Edison can sometimes make available during power outages. Creating an accurate inventory of these assets and developing protocols for facilities to follow when making a request for deployment of these resources are important steps in ensuring an efficient process of meeting needs for temporary power support.

Develop an Emergency Power Asset Mutual Aid Protocol – State, county and local Jurisdictions that own a significant number of emergency power assets available for deployment in a single geographic area should establish a mutual aid protocol to address how these temporary power assets can be more effectively deployed, either individually or collectively and under what circumstances.

Los Angeles County and the Cities of Los Angeles and Long Beach provide a good example on this front. Between 2013 and 2016, Los Angeles County government, in concert with the City of Los Angeles and the City of Long Beach, collectively purchased a sizeable number of deployable emergency generators with federal Urban Area Security Initiative (USASI) funds. Work is now underway to develop a mutual aid protocol that will determine when assets owned by these three jurisdictions will be deployed within and outside of their geographic boundaries.

Details on Recommended Actions to Boost a Jurisdiction's Emergency Power Preparedness for inclusion in Toolkit

Identification of Emergency Power Assets at Critical Infrastructure Facilities – One of the most important steps a jurisdiction can take to improve the efficiency of deploying temporary power assets is identifying the size, type and number of generators used by the jurisdiction's critical infrastructure facilities. This process will determine which temporary power assets are best suited for deployment to specific facilities. This is a critical step since a replacement generator needs to be as close in size to the generator being replaced as possible. Jurisdictions can work with trade associations representing different types of critical infrastructure to obtain this information.

Create an Emergency Power System Risk Calculation for individual critical infrastructure facilities – When a jurisdiction completes an inventory of emergency power systems at its critical infrastructure facilities, it will know which facilities rely on single generators for emergency power. It will also have information about the age of generators and other key components of an emergency power system. This information can be used to assign a risk rating to specific facilities. This risk rating will give a jurisdiction's emergency managers and public health officials a better sense of facilities with more vulnerable emergency power systems that would warrant closer scrutiny during an outage. The risk rating will also provide an indication that a facility may be more likely to require assistance during an extended outage.

Investment in quick connect devices to enable rapid connection of temporary emergency power assets to critical infrastructure facilities – A best practice recommended by the U.S. Army Corps of Engineers for jurisdictions seeking to bolster emergency power preparedness is to recommend that the critical infrastructure facilities in the jurisdiction invest in the installation of onsite quick connect devices, also known as manual transfer switches, that enable rapid installation of a temporary emergency power asset. This step significantly accelerates the process of connecting a temporary generator to a facility's electrical system, time savings that could make the difference between a medical facility having to evacuate or not. Any critical facility that does not have a permanent emergency power generator installed at its facility should take this action.

Registration of critical infrastructure facilities' emergency power systems in the Emergency Power Facility Assessment Tool (EPFAT) database - EPFAT is a secure, online tool developed by the U.S. Army Corps of Engineers to expedite the process of deploying a temporary federal generator to an impacted facility. Critical facilities are encouraged to use the EPFAT database to enter technical details about their emergency power system. When a facility's emergency power system is registered in the EPFAT database, the U.S. Army Corps of Engineers (USACE), which supports FEMA in the deployment of temporary emergency power assets, is able to accelerate deployment of generators to that facility since important details about the facility's emergency power system are already known.

Details on Recommended Actions to Boost a Jurisdiction's Emergency Power Preparedness for inclusion in Toolkit

If a facility requesting FEMA temporary power support is not in the EPFAT database, an assessment team from USACE must travel to the facility to inspect its emergency power system and determine the type and size generator needed as well as the amount of electrical cabling required to connect FEMA's trailer-mounted generator to the facility's electrical system. This process can add as much as a day to the overall deployment and installation timeframe. For facilities registered in the EPFAT database, USACE will be able to deploy the right generator assets directly to a facility without the need for an assessment team to undertake the time-consuming site inspection process. (A facility with a quick connect device that is also registered in the EPFAT database would represent a gold standard in emergency power preparedness.)

Stepped Up Coordination with Electric Utilities – In most jurisdictions, electric utilities work closely with emergency management agencies during blue sky days to foster enhanced coordination when disasters trigger power outages. An important element of this coordination that is often not addressed in sufficient detail is how utilities and emergency managers will communicate and coordinate when a critical infrastructure facility faces a serious threat to emergency power during an outage. This stepped up communication and coordination is critical since the potential for expedited power restoration for a stricken facility could alleviate concerns about a failing emergency power system. This enhanced coordination may also enable emergency managers to quickly determine that prioritized restoration is not possible for a facility, vital information that will inform decision making around temporary power deployment or potential evacuation of a critical healthcare facility.

Creation an Emergency Power Industry Working Group – Jurisdictions should create a working group between emergency managers and the generator service, fuel and rental industry to facilitate stepped-up pre-disaster coordination that will enable closer collaboration during extended power outages, especially around deployment of temporary emergency power assets. This coordination will also facilitate faster response by government officials in addressing obstacles impeding the ability of service, fuel and rental providers to meet the needs of critical infrastructure clients, i.e., road closures, regulatory hurdles, etc.

Identification of emergency power gaps in fuel distribution facilities – The Power Resilience Blueprint Action Step # 3, expanding the focus of FEMA's Temporary Emergency Power Task Force, recommends assessing emergency power gaps in key parts of the nation's fuel distribution system. This action should be incorporated by states as part of any effort to boost emergency power preparedness. Among the lessons learned during Hurricane Sandy was that many of the fuel terminals in New Jersey had sufficient fuel but lacked the emergency power equipment needed to operate pumps to fill fuel trucks needed to sustain operation of generators and to refuel gas stations. Among the post-Sandy preparedness enhancements was the installation of generators at these critical fueling stations.

Key Architects of the Power Resilience Blueprint for America

The Power Resilience Blueprint was developed by a team of disaster preparedness leaders with specialized knowledge of energy assurance and emergency power preparedness planning and response. The principal architects of the Power Resilience Blueprint for America include:

Eric Cote, Founder and Project Director, Powered for Patients – Powered for Patients is a federally funded 501c3 non profit focused on promoting emergency power resilience for critical healthcare facilities. Cote has developed cutting edge solutions to addressing threats to emergency power by facilitating increased collaboration between government officials, critical healthcare facilities, utilities and the private sector generator service, fuel and rental industry. Cote also led the team that developed the P.I.O.N.E.E.R. Tool under a contract with the Department of Homeland Security. The P.I.O.N.E.E.R. Tool provides real time, automated reports when emergency power is threatened during power outages. Cote is currently leading a Powered for Patients initiative in Los Angeles County to help the county and its hospitals better prepare for a large scale power outage.

Brigadier General (Retired) John Heltzel, Director of Resilience Planning for the Electric Infrastructure Security Council (EISC) – General Heltzel helps lead EISC's EARTH EX exercise and the organization's Black Sky Exercises designed to help communities understand the scope of planning needed to properly prepare for catastrophic disasters such as a widespread and prolonged power outage. Before joining the EIS Council, General Heltzel served as Director of the Kentucky Division of Emergency Management, where he led the Commonwealth's response to 10 presidentially declared disasters, including the 2010 catastrophic statewide ice storm. In leading the response to this disaster, General Heltzel helped coordinate one of the largest deployments of temporary federal generators in FEMA history.

Chris Beck, Ph.D., Chief Scientist and Vice President for Policy for the Electric Infrastructure Security Council (EISC) – Dr. Beck is a technical and policy expert in several homeland security and national defense related areas based n critical infrastructure protection, cybersecurity, science and technology development, WMD prevention and protection, and emerging threat identification and mitigation. Before joining the EIS Council, Dr. Beck served as the Staff Director for U.S. House of Representatives Homeland Security Subcommittee on Cybersecurity, Infrastructure Protection and Science and Technology. He also served as the Senior Advisor for Science and Technology for the Homeland Security Committee.

Paul Stockton, Ph.D., former Assistant Secretary of Defense for Homeland Defense and Americas Security Affairs, Managing Director of Sonecon, LLC. – Sonecon, LLC is an economic and security advisory firm in Washington, D.C. . During his tenure with the Department of Defense, Dr. Stockton led the DOD response to Hurricane Sandy, gaining valuable insight into the fuel supply system and its vulnerabilities to large scale disaster. Dr. Stockton serves as an advisor to both Powered for Patients and the EIS Council, where he serves as Editor in Chief of a series of Electric Grid

Protection (E-PRO) Handbooks, published by the Electric Infrastructure Security Council on black sky hazards facing the U.S. electrical grid. Based on his work on the Handbooks, Dr. Stockton served as the lead author for Department of Homeland Security's Emergency Support Function (ESF)-14 "Cross-Sector Business and Infrastructure," which provides new opportunities to integrate emergency power initiatives into broader resilience efforts.

Peter Navesky, U.S. Army Corps of Engineers (Retired) – Mr. Navesky has deep expertise in temporary emergency power support developed over his 39 years career with the U.S. Army Corps of Engineers (USACE). During his last two decades of service with USACE, Mr. Navesky's primary focus was supporting USACE's temporary power mission. In this capacity, he provided overall leadership for the program and served as a liaison to FEMA's logistics division, which manages the federal temporary power program in close coordination with USACE. Mr. Navesky was actively involved in many deployments of federal temporary power assets, including those sent in response to the 2004 Hurricanes Charlie, Francis, Ivan and Jeanne in FL; 2005 Hurricanes Katrina and Rita in LA; 2008 Hurricanes Gustav and Ike in LA and TX; 2012 Hurricane Sandy in CT; and 2017 Hurricanes Harvey, Irma and Maria in FL, TX, PR and USVI. For the past 11 years, Mr. Navesky served as a member of USACE's Permanent Cadre of Emergency Support Function #3 Team Leader, a group of senior officials that helps lead the Corps' response to disasters. In this capacity, Mr. Navesky was the "one door to the U.S. Army Corps of Engineers for Emergency Support Function 3", coordinating any Federal and State requirements for public works and engineering-related tasks associated with disaster

Overview of Power Resilience Blueprint Costs

Blueprint Action Step # 1	Targeted deployment of the DHS-funded P.I.O.N.E.E.R. tool to single-generator hospitals and skilled nursing facilities, especially those treating COVID-19 patients, to provide government officials and utilities with real time alerts when emergency power is threatened during a power outage to enable expedited response.	$300,000 to $2,375,000
Blueprint Action Step # 2	Rapid assessment of emergency power gaps at the nation's medical supply chain facilities deemed most critical by HHS/ASPR, development of recommendations to close gaps and deployment of the P.I.O.N.E.E.R. tool to any of these facilities with single-generator emergency power systems.	$35,000 to $50,000 for assessment and report with recommendations.*
Blueprint Action Step # 3	Deploying the P.I.O.N.E.E.R. Tool to Critical Infrastructure Beyond the Healthcare Sector that Relies on a Single Generator (Assumes 100 to 300 deployments)	$300,000 to $900,000
Blueprint Action Step # 4	Expand the mission of FEMA's Temporary Emergency Power Task Force to serve as a coordination mechanism at the highest levels of federal government and industry to formalize public-private partnership to enhance supply chain coordination.	$75,000 to $150,000*
Blueprint Action Step # 5	Develop a federal Energy Assurance and Emergency Power Preparedness Toolkit and provide additional technical assistance to support energy assurance and emergency power preparedness planning by states and local communities.	$35,000 to $50,000 for Toolkit Development.* $150,000 to $250,000 for SME deployment.*
Blueprint Action Step # 6	Launch stepped up emergency power preparedness planning across critical infrastructure sectors through engagement with industry leaders and their trade associations.	$50,000 - $75,000*
Blueprint Action Step # 7	Creation of emergency power rationing guidelines to help governors and local officials make difficult decisions about allocation of limited emergency power assets across critical all infrastructure sectors.	$50,000 - $100,000*

Blueprint Action Step # 8	Develop a long-range plan to boost America's energy resilience and emergency power preparedness that includes creation of enhanced standards to guide states in achieving significantly higher levels of emergency power preparedness.	$50,000 - $75,000*

*Projected cost range for this Blueprint Action Step is an estimate and does not include travel expenses or other out of pocket costs that may be incurred. Once the full scope of this Action Step is finalized with a jurisdiction, a more detailed cost projection can be provided.

Additional Detail on Deployment Costs and Options for the P.I.O.N.E.E.R. Tool

Expenditures Required for Various Levels of P.I.O.N.E.E.R. Deployment

Number of Facilities	Cost Per Facility (costs drop for installations above 300 facilities)	Total
100	$3,000	$300,000
200	$3,000	$600,000
250	$3,000	$750,000
300	$3,000/$2,500	$875,000
400	$3,000/$2,500	$1,125,000
500	$3,000/$2,500	$1,375,000
600	$3,000/$2,500/$2,000	$1,575,000
700	$3,000/$2,500/$2,000	$1,775,000
750	$3,000/$2,500/$2,000	$1,875,000
800	$3,000/$2,500/$2,000	$1,975,000
1000	$3,000/$2,500/$2,000	$2,375,000

Deployment Scenarios and Associated Costs by Type of Facility	# of Facilities	Cost per Facility	Total
Critical Access Hospitals in U.S. with single generator emergency power systems (Estimate of 216 facilities)	216	$3,000	$648,000
100 of the most sensitive medical supply chain facilities (as determined by HHS) with single generator emergency power systems	100	$3,000	$300,000
Deployments to critical infrastructure sites in pilot states. Assumes 25 deployments per state across both health care and non-healthcare critical infrastructure. Price will be lower if total number of deployments across all states and territories exceeds 250 or 500.	25	$3,000	$75,000 per state

Deployments at single generator hospitals, skilled nursing facilities and Critical Access Hospitals in the 10 states with the highest COVID-19 mortality rates (as of June 15, 2020). Projections for number of single generator hospitals and skilled nursing facilities (SNFs) per state are based on actual percentage of single generator hospitals in Los Angeles County and percentage of single generator skilled nursing facilities licensed to treat ventilator patients in the state of California.

New York			
Estimated # of Single Generator Hospitals	31	$3,000	$93,000
Estimated # of Single Generator CAH Hospitals (based on total of 18 CAH hospitals)	3	$3,000	$9,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	56	$3,000	$168,000
New Jersey			
Estimated # of Single Generator Hospitals	18	$3,000	$54,000
No Critical Access Hospitals	0	0	0
Estimated # of Single Generator SNFs licensed to provide ventilator care	19	$3,000	$57,000

Connecticut			
Estimated # of Single Generator Hospitals	5	$3,000	$15,000
No Critical Access Hospitals	0	0	0
Estimated # of Single Generator SNFs licensed to provide ventilator care	20	$3,000	$60,000
Massachusetts			
Estimated # of Single Generator Hospitals	15	$3,000	$45,000
Estimated # of Single Generator CAH Hospitals (based on total of 3 CAH hospitals)	0	0	0
Estimated # of Single Generator SNFs licensed to provide ventilator care	15	$3,000	$45,000
Rhode Island			
Estimated # of Single Generator Hospitals	2	$3,000	$6,000
No Critical Access Hospitals	0	0	0
Estimated # of Single Generator SNFs licensed to provide ventilator care	7	$3,000	$21,000
District of Columbia			
Estimated # of Single Generator Hospitals	2	$3,000	$6,000
No Critical Access Hospitals	0	0	0
Estimated # of Single Generator SNFs licensed to provide ventilator care	12	$3,000	$36,000
Louisiana			
Estimated # of Single Generator Hospitals	38	$3,000	$114,000
Estimated # of Single Generator CAH Hospitals (based on total of 27 CAH hospitals)	4	$3,000	$12,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	40	$3,000	$120,000

Michigan			
Estimated # of Single Generator Hospitals	23	$3,000	$69,000
Estimated # of Single Generator CAH Hospitals (based on total of 37 CAH hospitals)	6	$3,000	$18,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	23	$3,000	$69,000
Illinois			
Estimated # of Single Generator Hospitals	15	$3,000	$45,000
Estimated # of Single Generator CAH Hospitals (based on total of 51 CAH hospitals)	8	$3,000	$24,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	65	$3,000	$195,000
Pennsylvania			
Estimated # of Single Generator Hospitals	38	$3,000	$114,000
Estimated # of Single Generator CAH Hospitals (based on total of 15 CAH hospitals)	2	$3,000	$6,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	63	$3,000	$189,000

Deployments at single generator hospitals, skilled nursing facilities and Critical Access Hospitals in the 10 most populous states. Projections for number of single generator hospitals and skilled nursing facilities (SNFs) per state are based on actual percentage of single generator hospitals in Los Angeles County and percentage of single generator skilled nursing facilities licensed to treat ventilator patients in the state of California.

California			
Estimated # of Single Generator Non-CAH Hospitals	51	$3,000	$153,000
Estimated # of Single Generator CAH Hospitals (based on total of 34 CAH hospitals)	5	$3,000	$15,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	100	$3,000	$300,000
Texas			
Estimated # of Single Generator Non-CAH Hospitals	45	$3,000	$135,000
Estimated # of Single Generator CAH Hospitals (based on total of 82 CAH hospitals)	13	$3,000	$39,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	110	$3,000	$330,000
Florida			
Estimated # of Single Generator Non-CAH Hospitals	53	$3,000	$159,000
Estimated # of Single Generator CAH Hospitals (based on total of 13 CAH hospitals)	2	$3,000	$6,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	62	$3,000	$186,000
New York			
Estimated # of Single Generator Non-CAH Hospitals	31	$3,000	$93,000
Estimated # of Single Generator CAH Hospitals (based on total of 18 CAH hospitals)	3	$3,000	$9,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	56	$3,000	$168,000

Illinois			
Estimated # of Single Generator Non-CAH Hospitals	15	$3,000	$45,000
Estimated # of Single Generator CAH Hospitals (based on total of 51 CAH hospitals)	8	$3,000	$24,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	65	$3,000	$195,000
Pennsylvania			
Estimated # of Single Generator Non-CAH Hospitals	38	$3,000	$114,000
Estimated # of Single Generator CAH Hospitals (based on total of 15 CAH hospitals)	2	$3,000	$6,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	63	$3,000	$189,000
Ohio			
Estimated # of Single Generator Non-CAH Hospitals	18	$3,000	$54,000
Estimated # of Single Generator CAH Hospitals (based on total of 33 CAH hospitals)	5	$3,000	$15,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	25	$3,000	$75,000
Michigan			
Estimated # of Single Generator Non-CAH Hospitals	23	$3,000	$69,000
Estimated # of Single Generator CAH Hospitals (based on total of 37 CAH hospitals)	6	$3,000	$18,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	23	$3,000	$69,000

Georgia			
Estimated # of Single Generator Non-CAH Hospitals	24	$3,000	$72,000
Estimated # of Single Generator CAH Hospitals (based on total of 30 CAH hospitals)	5	$3,000	$15,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	28	$3,000	$84,000
North Carolina			
Estimated # of Single Generator Non-CAH Hospitals	17	$3,000	$51,000
Estimated # of Single Generator CAH Hospitals (based on total of 20 CAH hospitals)	3	$3,000	$9,000
Estimated # of Single Generator SNFs licensed to provide ventilator care	38	$3,000	$114,000