N A R U C
National Association of Regulatory Utility Commissioners

EPRR TASK A, TECHNICAL OUTLINE OF A BLACK SKY PLAYBOOK:

Literature Review

CONVERGE STRATEGIES

MARCH 2021

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CONVERGE STRATEGIES

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Written for Black Sky by SMEs

- EPRO Handbook series
- IEEE “Towards Bulk Power System Resilience”
- FERC Resilience Order 2017

BLACK SKY HAZARDS

TITLE	SUMMARY	KEY PROJECT LESSONS
Resilience for Black Sky Days: Supplementing Reliability Metrics for Extraordinary and Hazardous Events, by Paul Stockton The National Association of Regulatory Commissioners | February 2014	Dr. Stockton's report provides the basis for defining and creating a methodology for investing in utility resilience. The report offers tools to assess resilience initiatives by focusing on extraordinary hazardous events, i.e., Black Sky days.	This report is an excellent source for understanding and setting usable metrics for a variety of Black Sky threats.
Helios Solar Storm Scenario University of Cambridge | November 2016	The study of solar eruptive phenomena has progressed over the centuries… (but) there is still a great deal of uncertainty around the potential economic impacts of extreme space weather on modern society. This report provides a catastrophe scenario for a US-wide power system collapse that is caused by an extreme space weather event affecting Earth: the Helios Solar Storm scenario. This scenario is a stress test for managers and policy- makers. Stress tests are important for understanding risk exposure across a spectrum of extreme systemic shocks…	This work is a standard-setter for understanding how a Coronal Mass Ejection (one of the Black Sky Hazards) has the potential to generate geomagnetically induced currents (GICs) that could cause permanent damage to Extra High Voltage (EHV) transformers. This work adds clear definition of the threat and the potential cascading consequences.

INFRASTRUCTURE PLANNING

TITLE	SUMMARY	KEY PROJECT LESSONS
Enhancing the Resilience of the Nation's Electricity System National Academies of Sciences, Engineering, and Medicine | 2017	Identifying, developing, and implementing strategies to increase the power system's resilience in the face of events that can cause large-area, long-duration outages: blackouts that extend over multiple service areas and last several days or longer. Resilience is not just about lessening the likelihood that these outages will occur. It is also about limiting the scope and impact of outages when they do occur, restoring power rapidly afterwards, and learning from these experiences to better deal with events in the future.	This work adds value to the project with clear recommendations for addressing the root cause of a Black Sky threat and outlining coordinating and collaborating considerations.
Reimagining Grid Resilience: A Framework for Addressing Catastrophic Threats to the US Electricity Grid in an Era of Transformational Change, by Dyson, Mark and Xilu Li, Becky Rocky Mountain Institute Report | 2020.	Reliable and resilient delivery of electricity to homes and businesses is a foundation of national prosperity, and grid outages have grave consequences…This report describes the changing nature of resilience within the US grid and details specific recommendations to take advantage of current technological trends. This will help bring about investment in a grid that promotes resilience by design, economically and from the bottom up, and not as a cost-adding afterthought years later.	This work directly supports the project's central themes, providing a full set of potential solutions and actions that can be considered and supported by the regulatory community.

INFRASTRUCTURE PLANNING

TITLE	SUMMARY	KEY PROJECT LESSONS
State Energy Assurance Guidelines, Version 3.1 National Association of State Energy Officials (NASEO) and the National Association of Regulatory Utility Commissioners (NARUC) | December 2009.	The guidelines integrate the lessons learned from responding to energy emergencies in recent years and from the dialogue that has occurred at conferences, exercises and meetings on energy assurance. They encompass many topics that states may wish to consider incorporating into their plans	This early work examines and puts forth several essential issues and recommended solutions. It is an excellent source for roles and key responsibilities at the state and federal levels. This guide is an excellent and still valid source material.
The National Infrastructure Protection Plan: Partnering for Critical Infrastructure Security and Resilience (NIPP) Cybersecurity & Infrastructure Security Agency | 2013.	The heart of the National Plan is the Call to Action, which … provides strategic direction for the national effort in the coming years through coordinated and flexible implementation by Federal departments and agencies—in collaboration with SLTT, regional, and private sector partners, as appropriate. This outcome-driven National Plan facilitates the evaluation of progress toward critical infrastructure security and resilience through its goals and priorities and their associated outputs and outcomes.	This work provides the foundation for an integrated and collaborative approach to achieve the vision of a more secure homeland. It specifically addresses the roles and requirements to address a disrupted energy environment

INFRASTRUCTURE PLANNING

TITLE	SUMMARY	KEY PROJECT LESSONS
Extreme Weather and Climate Vulnerabilities of the Electric Grid: A Summary of Environmental Sensitivity Quantification Methods Oak Ridge National Laboratory | August 2019	Climate hazards and extreme weather affect all components of the electric grid system, from generation to end use. Increasing temperatures, decreasing water availability, more intense storm events, and sea level rise affect the ability of the electric grid to produce and transmit electricity from fossil, nuclear, and existing and emerging renewable energy sources. Most electricity infrastructure is built for past or current climate conditions… This report highlights the analytical resources available for sensitivity assessment of electrical grid components under extreme weather and climate, and identify gaps in the literature on quantitative methods available for assessment of component vulnerability.	This Oak Ridge publication is an essential work that adds a means to quantify the potential impacts of various naturally occurring hazards. It has value in that it offers a means for quantification. It does not address many human-made threats but adequately sets a standard forward for adaption and potential adoption.
Local Government Energy Assurance Guidelines: Version 2.0, Public Technology Institute | 2011	The PTI Guidelines were formed to assist local communities in preparation for and response to natural and man-made disasters, which often results in a loss of the energy required to uphold critical operations.	This PTI guide is a solid planning document that may have a minor impact in addressing the regulatory issues. Its best use is in clearly identifying work to be done at the local level.

Infrastructure Planning

TITLE	SUMMARY	KEY PROJECT LESSONS
Review of February 2021 Extreme Cold Weather Event – ERCOT Presentation ERCOT | February 2021	Urgent Board of Directors Meeting Presentation - Information in this presentation is preliminary and represents the best available data at the time it was created.	This review is an excellent and timely work that the project can use to draw on central regulatory issues that can lead to a potentially Black Sky event. This is a straightforward presentation of the facts know at the time of publication.
Powering Through: Building Critical Infrastructure Resilience - (NDRC) Mary Lasky et al | November 2020	The critical infrastructures that our nation relies on are vulnerable to natural and man-made threats. The nation has been most fortunate during COVID-19 that the critical infrastructures have performed well, but the pandemic is a wakeup call. What if – we had not had electric power? Without our electric power, we would not have water/wastewater, communications. Refineries could not provide fuel; hospitals might be ok for a few days and then what happens would happen? How could grocery stores or pharmacies function without electric power?	This recently published foundational work establishes the potential impact of cascading outages impacting multiple critical sectors. Its value to the project is in the precise language that examines the threats and establishes the critical nature for addressing Black Sky threats in advance.

PLAYBOOK DEVELOPMENT

TITLE	SUMMARY	KEY PROJECT LESSONS
The EPRO Handbook Series EIS Council | 2018	The Handbook project examines how utilities, government actors, and other stakeholders can collaborate in building resilience and reducing the probability of sustained, large-scale outages. The first Handbook focuses on all-hazard community preparedness and specific-hazard mitigation; the second, on Black Sky resilience and operational strategies for the Water and Oil & Gas sectors; and the third, on cross-sector communication during Black Sky events.	These foundational books are some of the best available on the potential impact of a Black Sky threat. They address the Electric Sector, Water and Oil and Natural Gas, Communications, and the latest version details the EMP threat.
Community Resilience Planning Guide for Buildings and Infrastructure Systems NIST Special Publication 1190 Vol II | October 2020	The Guide aims to aid communities in addressing challenges related to disaster recovery by minimizing disastrous consequences. It demonstrates a practical approach that takes into account the dependencies of communities on their buildings and infrastructure systems.	This work is an excellent foundation for understanding Dependencies and the Linkage between community assets and social institutions. It introduces the six-step planning process for energy systems and outlines resilience issues that must be addressed.

PLAYBOOK DEVELOPMENT

TITLE	SUMMARY	KEY PROJECT LESSONS
Power Outage Incident Annex to the Response and Recovery Federal Interagency Operational Plans: Managing the Cascading Impacts from a Long-Term Power Outage (POIA) Department of Homeland Security | June 2017	POIA is intended for federal departments and agencies with a role in emergency management, POIA offers guidance for responders to support local, state, tribal, territorial, and insular area efforts in response and recovery.	The value of this work to the project is the guidance it provides for federal-level responders to provide response and recovery support to local, state, tribal, territorial, and insular area efforts for a power outage. However, it does not contribute substantially to any regulatory or energy assurance requirements at the state level.
Energy Sector-Specific Plan U.S. Department of Energy | 2015	The purpose of the Energy SSP is to help guide and integrate the sector's continuous effort to improve the security and resilience of its critical infrastructure and to describe how the Energy Sector contributes toward the national critical infrastructure security and resilience goals. The 2015 Energy SSP updates and augments the prior versions of the SSP in accordance with the NIPP 2013.	This work is valuable as it characterizes the widely-diverse infrastructure components, a multifaceted operational environment, and complex ownership and regulatory structures. It outlines shared responsibility between the government and industry.

PLAYBOOK DEVELOPMENT

TITLE	SUMMARY	KEY PROJECT LESSONS
Federal Interagency Operational Plans FEMA | August 2016	The Federal Interagency Operational Plans (FIOPs) describe how the federal government aligns resources and delivers core capabilities to implement the five National Planning Frameworks. The FIOPs provide a federal concept of operations, integrating and synchronizing national-level capabilities, for prevention, protection, mitigation, response, and recovery to support all levels of government. These plans also help federal departments and agencies develop and maintain department-level operational plans.	This planning series is an essential set of documents that outline the activities that occur in steady-state and, more importantly, when responding to a Black Sky event when protective actions are required during times of elevated risk. This document outlines the synchronization requirements to coordinate, adapt, and align activities.
National Response Framework, 4th Edition FEMA | October 2019	Built on over 25 years of Federal response guidance, the NRF "sets the strategy and doctrine for how the whole community builds, sustains, and delivers the response core capabilities identified in the National Preparedness Goal in an integrated manner with the other mission areas." This edition focuses on collaboration and communication as the key to achieving a unity of effort by synchronizing the government and private sector.	This framework is the source document for understanding the structures, roles, and responsibilities that can be partially or fully implemented to address a threat or hazard in anticipation of a significant event or response to an incident. It includes essential information on the structures and procedures.

PLAYBOOK DEVELOPMENT

TITLE	SUMMARY	KEY PROJECT LESSONS
Threat and Hazard Identification and Risk Assessment (THIRA) and Stakeholder Preparedness Review (SPR) Guide: Comprehensive Preparedness Guide 201 3rd Edition Department of Homeland Security | May 2018	The THIRA helps communities understand their risks and determine the level of capability they need in order to address those risks. The outputs from this process lay the foundation for determining a community's capability gaps during the SPR process. Used appropriately it can provide essential information about the status of capabilities and considerations for identifying the essential data required for planning efforts, including the development of strategic, operational, and tactical plans.	The THIRA establishes a standard process for identifying community-specific threats and hazards and setting targets for each core capability identified in the National Preparedness Goal. Its value to the project is in standardizing an approach to threat identification that can be used across jurisdictions.
Developing and Maintaining Emergency Operations Plans: Comprehensive Preparedness Guide (CPG) 101 Version 2.0 Department of Homeland Security | November 2010	The goal of CPG 101 is to make the planning process routine across all phases of emergency management and for all homeland security mission areas...CPG 101 is designed to help both novice and experienced planners navigate the planning process. Used in its entirety, this Guide provides information and instruction on the fundamentals of planning and their application.	This document guides the development of emergency operations plans. Its value is in the common understanding of the fundamentals of risk-informed planning and decision making. It provides another opportunity to coordinate actions and synchronize plans.

PLAYBOOK DEVELOPMENT

TITLE	SUMMARY	KEY PROJECT LESSONS
Federal Sector Black Sky Guidebook, EIS Council | December 2018	This Federal Sector Black Sky Guidebook reflects collective input from numerous partners, as well as operational industry technical personnel, as a recommended framework for planning resilience investments, restoration planning and cross-sector coordination needed for long duration, multi-region power outages. This document is designed as a planning resource by addressing critical Black Sky resilience needs for Preparation/Mitigation, Response, Restoration and Recovery measures.	This guide focuses on the federal roles and provides essential elements addressing assumptions, initial actions, internal requirements, and cross-sector dependencies. Its value to the project is in identifying essential elements that must be addressed at all levels to support a restoration of critical infrastructure.
Enhancing the Security of the North American Electric Grid US Congressional Budget Office | March 2020	The electric grid is a collection of generating facilities that produce electricity, customers that use it, and intermediate power lines and other equipment that deliver it to those customers. The vast majority of the threats it faces are localized and handled by the grid's operators with minimal disruption for customizers. But some threats to the grid might cause a widespread and long-lasting outage. Threats of that scale are the topic of this report, along with potential approaches to improve the grid's security against those threats.	This CBO document outlines critical considerations to prevent or limit damage to the grid and improve supply-chain considerations. Considerations include the appropriate role for the federal government, outlining what resilience factors to weigh, and comparing the advantages and disadvantages of federal intervention.

PLAYBOOK DEVELOPMENT

TITLE	SUMMARY	KEY PROJECT LESSONS
Energy Grid Resilience Report Business Executives for National Security | March 2020	U.S. national security and commerce depend on the uninterrupted flow of electricity delivered through the electric grid (the grid). The grid is a highly complex, interconnected network that produces and delivers power to all sectors of society, including homes, businesses, and critical infrastructure sectors such as first responders, airports, and military installations. This assessment identified four state-level approaches that are important for grid resiliency, and if practiced across the country would lead to a more resilient national grid.	This report is an excellent and current document that outlines the complexity of the grid. It outlines specific initiatives in seven states – California, Florida, Illinois, Maryland, New Jersey, New York, and Texas – that provide examples of forward-leaning efforts of public and private sector cooperation for grid resilience. It contains case studies and provides both positive examples and failed initiatives reference the Texas situation one year later.
Local Government Energy Assurance Guidelines: Version 2.0 Public Technology Institute | 2011	The PTI Guidelines were formed to assist local communities in preparation for and response to natural and man-made disasters, which often results in a loss of the energy required to uphold critical operations.	The strength of the PTI Guidelines lies in their focus on cities and counties in providing energy assurance plans. They include essential information on local needs and how they factor into planning and response mechanisms for emergency situations. The Guidelines offer a flexible approach to preparing energy assurance plans that is particularly helpful in considering localities.

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CONVERGE STRATEGIES

		MONTHS							
Task #	**Support for Emergency Preparedness, Recovery, and Resiliency Task Force and Related Activities**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**
Task A	**Black Sky Playbook**								
Task A. 1	Literature Review								
Task A.2	Needs Assessment								
Task A. 3	Use Cases								
Task A. 4	Playbook Content Outline								
	Quarterly Presentation Dates			**Q1**		**Q2**		**Q3**	
	Deliverable								