
EPRO® SECTOR Executive Committee, Winter 2016

December 13th, 2016 | PJM Headquarters, Valley Forge, Pennsylvania.

Executive Summary

Background:

In Black Sky hazards, long duration, subcontinent-scale power outages and associated cascading failures of all our interdependent lifeline utilities will drastically limit availability of external services essential to support both the affected population and infrastructure restoration. These failures will occur precisely at the time when infrastructure services are desperately needed to restore operation of critical utilities, and to sustain tens of millions of Americans. No single sector can function without the partner sectors each depends on. Consequently, if the nation is to be adequately prepared to meaningfully survive such scenarios, coordinated planning and engagement are critical.

To resolve the “Catch-22” problem of sector interdependencies in highly disrupted environments, such planning must be remarkably broad, addressing the full range of essential sectors. It must also be operationally focused, designed to ensure each sector’s planning addresses three critical elements needed for such Black Sky hazard environments:

- **Black Sky Mission:** Key missions, products or services the sector will need to provide.
- **Internal Requirements:** The “internal” operational requirements the sector will need to take on to address their Black Sky mission.
- **External Requirements:** The “external” operational requirements or support the sector will need from its partners – spanning both essential products and services and the policy or regulatory environment – which, when coupled with their own “internal” operational requirements, will make it possible for them to meet their Black Sky mission.

These three elements represent a classic example of the “Systems Engineering” methodology that has been so instrumental in the development of modern technology, where integrated development is always required across many professional disciplines.

EPRO SECTOR is designed to help host this unique multi-sector coordination process. Each participating sector is developing their own Black Sky Playbook to address these three Systems Engineering elements, as the core process reviewed in biannual EPRO SECTOR planning meetings.

Key Discussion Points:

Among the main points to emerge from the meeting:

The Black Sky threat environment is dynamic, complex and variegated. In the malicious category, the most likely form threats could take would be asymmetric attacks, from terrorist organizations and from a hostile nation state. Both active and potential adversaries are actively probing the vulnerabilities in US critical infrastructure. Given today’s status, without dramatic improvement in both Black Sky resilience investment and coordinated planning for restoration support and sustained minimal services to affected populations, a serious attack on critical infrastructure would have irrecoverable, devastating impact on the U.S. or allied nations.

Our society, our economy, our security and our lives are now intimately and completely dependent on electrical power. From food and water to communications, transportation, health care and security, all functionality of modern society is now tied into sustained operation of the power grid. In addition to this vast array of direct dependencies, even areas that one might not expect are utterly reliant on electrical power. For example, in the military sphere, the Air Force's planes are no longer powered only by jet fuel. Electric-powered drones play an important role and so a reliable power supply is crucial.

The gaps that must be filled in both Black Sky resilience investment and coordinated, multi-sector planning are substantial. However, there is real progress in both of these areas. The path-breaking EPRO Black Sky Playbook development project documents the resilience initiatives that define preparedness measures, response actions, restoration activities. It is guided by the overall goal of enhancing resilience of the nation's infrastructure sectors and their government and NGO partners, and cross-sector planning, to a level that will provide crucial support to infrastructure restoration, and permit most people in affected regions to shelter in place. In addition, power and water utility companies are beginning to take important steps to protect against Black Sky hazards. Dominion Energy's efforts, described by David Roop below, are a prime example.

Coordinated planning between sectors is crucial. Such coordination requires continuous effort and improvement. Currently eight sectors are involved in the EPRO SECTOR effort, developing sector by sector and cross sector requirements, operational plans and doctrine. There is an urgent need to expand this work to cover additional sectors including the transportation, health, food and finance sectors.

Utilities should be represented in state emergency planning. Water and power utility managers should participate in state emergency planning exercises and should also be sitting on state and local Emergency Planning Committees.

Maintaining drinking water and wastewater services is essential for achieving the critical mission for Black Sky scenarios, in supporting restoration and enabling shelter-in-place and, ultimately, in preserving life. "The one thing that will produce mass migration faster than anything else is sewage backing up in your basement." However emergency planning in the water sector in the U.S. is hampered by the need to build coordinated planning that will span the large number (around 52,000) of water companies in the country. This can be aided by focusing as a first priority on the 410 "very large" water systems for large cities that each serve more than 100,000 people. There is a particular shortage of emergency generation capacity in the water and waste water sectors. In addition, their generators are not protected for cyber or EMP, they have insufficient diesel tanks and are not designed for continuous operation. They also do not have plans in place for resupply of fuel or chemicals.

More, larger and widely distributed emergency generators are required There is a need for much expanded, regionally distributed emergency generator inventories. These inventories require prioritization for emergency use, tech support and preplanned diesel resupply. Many thousands of Megawatts of additional capacity are likely to be needed.

Mass migration from large cities will not work. The numbers of people to be moved are too large. Moreover, cities represent complex, aggregated infrastructure developments designed to support the lives of large populations. This infrastructure cannot be instantaneously recreated elsewhere. Unplanned mass migration is likely to be disastrous. People should be enabled to

shelter in place for as long as possible. At the same time, one must recognize that, beyond what can be done to maximize shelter in place, some populations will either be asked to evacuate or will self-evacuate. Planning is needed to allow mass care NGOs and their government partners to provide for such evacuated shelter needs

NGOs make a vital contribution to disaster relief and recovery. Governments should encourage volunteering to ensure that these essential civil society organizations are healthy and strong. NGOs play an important role both in sustaining affected populations and also in supporting the families of emergency and recovery workers. At the same time, mass care NGOs must add the Black Sky area to their existing planning work. The funding for this effort may need to come from each infrastructure sector, in recognition of their requirement for NGO support in a major emergency.

Recovery will require a very widely distributed, fully interoperable emergency communications system. The system should be preplanned to operate in Black Sky scenarios, and with built-in provisions for 30 days + of self-power. This will be essential for both infrastructure restoration and sustaining the affected population. In Superstorm Sandy, all normal communication systems were lost, including cell phones and land lines. During Hurricane Katrina it took four days to install a temporary communication system for very limited use. Without adequate communications, coupled with built-in coordination support, restoration cannot even begin. EIS Council has initiated design for a Black Sky Emergency Communication and Coordination System (BSX™) that could address this need. ¹

Local, State and Federal government agencies, private companies and NGOs need to start planning for both advance preparations and real-time coordination of restoration and population sustainment efforts in these scenarios. The upcoming EPRO Handbook III, planned for publication in 2017, will analyze opportunities for such coordination planning, as well as summarizing the BSX opportunity. Previewing the EPRO Handbook III at this meeting, Paul Stockton declared that while the Federal Government has cultivated “stovepipes of excellence,” it needs to do much more to promote cross-sector planning. Among the recommendations that will likely emerge from the Handbook, some adjustments in planning and organizational structure, both for the public and private sector, will be needed. As one example, the Stafford Act, needs to be revisited. “We need to be thinking about amending the Stafford Act and tapping the Department of Defense federal resources earlier in the game... lost time means loss of life.”

How do we build resilience in the general population? Several speakers stressed the importance of preparing the public to be survivors rather than victims. A number pointed to the remarkable resilience of the Israeli civilian population, and asked whether, notwithstanding the special circumstances of Israel’s history, there are resilience lessons that are transferrable to the US.

¹ For a description of the BSX system, see http://www.eiscouncil.com/App_Data/Upload/40f47ea2-1e20-477d-bce6-34e6d3983487.pdf.

Welcome and Introduction

Terry Boston, Chairman, EPRO Sector Executive Committee

Terry Boston emphasized the urgency of threats to infrastructure. As an example, he singled out the dictator of North Korea as developing the capacity to do very serious harm to America. Hostile nations such as North Korea are evolving asymmetric warfare strategies to inflict damage on the United States' advanced, interconnected infrastructure, economy and society. Boston praised EIS Council and the assembled audience of sector heads for the progress they have made in protecting against these threats and especially mentioned Israel's work in hardening its electricity grid against a potential EMP attack.

“What do you know, and how do you know you're in a black sky event? How fast can you determine it? What kind of damage assessments to you do?”

He proposed three sets of guiding questions to motivate the day's discussions:

“What information do you need to make good decisions? How do you get that information?”

First, regarding situational awareness, “what do you know, and how do you know you're in a black sky event? How fast can you determine it? What kind of damage assessments to you do?”

Second, in the area of decision making, “What information do you need to make good decisions? How do you get that information?”

Third, in the area of communications, “who do you talk to? And how do you ask for resources?”

"The Need for Focused Cross-Sector Planning: Meeting the Challenge"
Avi Schnurr, CEO and President, EIS Council

Avi Schnurr described the tremendous success of modern, electricity dependent, interconnected infrastructure and pointed out the critical vulnerabilities that this interdependence opens up. "Our society, our economy, our security and our lives are now intimately and completely dependent on electrical power. From food and water to communications, transportation, health care and security, all functionality of modern society is now tied into sustained operation of the power grid." In a massive, prolonged outage, each of the sectors will reach a point where they need the other sectors, who are similarly incapacitated, in order to recover. "Only detailed, advanced planning and coordination between the sectors can break this "Catch 22," Schnurr said. We need dramatic improvements in both Black Sky resilience investment and coordinated planning for restoration support and sustained minimal services to affected populations, if such an event is to be survivable."

"The approach needs to be based on excellent, extremely operationally focused, coordinated planning.

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"What we're dealing with is a situation which cannot succeed if peoples' focus is 'this is what my job description says; this is how I enhance my profit or enhance my career.' That focus will not do it for this problem."

Finally, he commended the vision, leadership and "nobility of spirit" in the sector leaders and officials devoting time to addressing Black Sky hazards: "What we're dealing with is a situation which cannot succeed if peoples' focus is this is what my job description says; this is how I enhance my profit or enhance my career. That focus will not do it for this problem."

Morning Keynotes

"U.S. Air Force Planning for Extended Power Outages"

Hon. Miranda Ballantine, Assistant Secretary, Installations, Environment, and Energy, Department of the Air Force

Miranda Ballentine began by surveying three big trends affecting how the US Air Force achieves energy security and resilience.

The first is the outsourcing of generation: "we have systematically and intentionally outsourced

"Our missions have become dramatically more dependent on electrons."

power generation that we used to have on bases." This has been driven by the need for reliable and affordable power.

Second, "our missions have become dramatically more dependent on electrons." Drone warfare, GPS, space technology and advanced command and control electronics depend critically on electricity.

"In the last five years or so, we've experienced a major shift in the threat environment to these power grids that we are reliant upon."

Third, "In the last five years or so, we've experienced a major shift in the threat environment to these power grids that we are reliant upon." In view of these trends, the Air Force is prioritizing energy supply that is clean, cost-effective and resilient, for example the 15 MW solar array just installed at the Davis-Monthan Air Force base which is producing power at \$0.045/kWh.

In response to the new threat environment, the Air Force is investing resources in mapping its vulnerabilities. It is protecting and defending its networks. "You could see a determined adversary taking more of a precision strike approach and coming in directly to an air force, army, or navy base and disabling our military operations," Ballentine warned. Finally she declared, "we need to use our research labs and partner with the research labs across the rest of the federal government and with all of you to rapidly deploy game-changing technologies."

Liz Dalton, Principle Deputy Assistant Secretary at the Department of Energy, for the Office of Electricity Delivery, Energy Reliability

Dalton opened by describing the Department of Energy's just-published EMP strategy, which details what the DOE will be doing with the rest of the Federal Government to protect and prepare against EMP over the coming five years. In addition, the government has established a GMD-EMP working group that will take a cross-departmental perspective, focusing in particular on the government labs that are available to research and test GMD-EMP impacts.

“Cyber-security remains a high priority for the Department of Energy”

She stressed that “cyber-security remains a high priority for the Department of Energy” and referred to Presidential policy Directive 41, announced in July 2016, which sets out how the Federal government would respond to a major cyber-attack. She also noted that under the 2015 FAST (Fixing America's Surface Transportation) act requires the DOE to take a number of resilience-related steps, including developing a report on plans strategic transformer reserve plans, examining the availability or otherwise of spare transformers in the event that a Black Sky event took out transformers on the grid.

Dalton also described the new U.S./Canada Grid Strategy. She listed three key components: “Number one is protecting the grid as it exists today. Number two is enhancing our ability to respond and recover from any event. And this is all hazards. Number three, building the grid of the future in a reliable and safe way.”

She also stressed two points of particular interest to the EPRO meeting: that the DOE is looking closely at the interdependencies of critical infrastructure and also at the need to exercise black start capabilities.

**Bob Kolasky, Deputy Assistant Secretary, Office of Infrastructure Protection at
U.S. Department of Homeland Security**

Kolasky described how the DHS has begun to incorporate threats to the electric grid from nation states into its strategic risk picture. Other countries are showing their ability and willingness to act the US grid, particularly using cyber. Kolasky announced that the DHS is about to release its National Cyber incident Plan, “which is the first large-scale national plan that connects the national response framework to a cybersecurity incident response plan.”

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He underscored the importance of exercising, noting “the good thing about planning is it leads to exercises.” Kolasky singled out the role of EISC in facilitating some of the exercises in which the DHS will be taking part and enabling the DHS to do much more inter-sectoral training. He also stressed DHS’s efforts in the area of information sharing. Much important information, for example, about the effects of EMP is classified. DHS makes a contribution through persuading intelligence agencies to declassify and release some of this material, to help with “getting the classified information out to industry.”

“The good thing about planning is that it leads to exercises.”

Finally, he reassured participants that even after the January 20th transition to a new administration he and the majority of his colleagues would still be working on infrastructure security and resilience.

Session One: Coordinated Planning for Black Sky Hazards

"The National Restoration Coordination (NRC) Initiative"

Dr. Paul Stockton, Former Assistant Secretary of Defense; Managing Director, Sonecon LLC; Principal Author and Editor in Chief, EPRO Handbooks I and II

EPRO Handbook III

Paul Stockton spoke about the main challenges and questions that will be addressed in EPRO Handbook III. He began by quoting the opening of Handbook:

"Handbook III will examine opportunities to better integrate and prioritize the restoration of life-line infrastructure sectors in black sky events. In particular, the study will analyze how these infrastructure sectors can help each other accelerate the restoration of service and transform their interdependencies from being a peril into a foundation for resilience." Stockton emphasized the point that "so much of what we need to be able to do for black sky preparedness involves sectors assisting each other to restore critical infrastructure."

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Goals for a Black Sky event

He set out three critical goals for a Black Sky event. The first is to save and sustain lives. This involves avoiding unplanned mass migrations, maximizing people's ability to shelter in place and working with NGOs to care for the population in an organized way.

Secondly, "we need to ensure that all the sectors represented here can help each other accelerate service so that the adversary cannot achieve the political and military goals that are their reason for attacking." A hostile attack on infrastructure will have as a primary goal, creating chaos in the US so as to put political pressure on the President to accede to the adversary's demands. Sustaining essential services helps prevents this.

“We need to ensure that all the sectors represented here can help each other accelerate service so that the adversary cannot achieve the political and military goals that are the reason for attacking.”

The third goal is recovery. It is important to prioritize the steps that will ensure that the United States can recover from a catastrophic event. For example, if at least some water pressure can be sustained to prevent the pipes collapsing, the prognosis for recovery will be radically better than if pipes collapse because all water pressure is lost.

Stockton maintained that, while much good work is being done to build resilience within sectors, inter-sectoral preparation is in its infancy. “I think that government has been guilty of building stovepipes of excellence,” he declared, and urged the Federal Government to do much more to prepare for a multi-sector event. “I believe we need a cross-sector infrastructure restoration scissor initiative,” Stockton declared, explaining that we need a detailed, operational cross-sector planning and exercising to prepare against a wide-spread, prolonged power outage with cascading impacts on other critical infrastructure.

Changing Threat Environment

Finally, in the context of the changing threat environment, Stockton warned that in a man-made event there would likely be hybrid attacks, including for example combinations of physical and cyber assaults. Information warfare would probably be used to impede recovery efforts, he predicted: “you're going to have false reporting on outages, on chemical factories going down, and emitting toxic clouds. Everything the adversary can do to achieve the political and military effects for which the adversary attacked in the first place.”

Session Two: The Electricity/ Fuel / Water Nexus

Introduction: "The Key Challenges and Opportunities for the Electric Subsector"

**Jonathon Monken, Senior Director, System Resiliency and Strategic
Coordination, PJM Interconnection; EPRO Electric Subsector Co-Chairman**

Monken introduced the series of sector-based discussion as an opportunity to consider each sector's internal and external requirements in a Black Sky event.

Monken opined that for the electric sector's internal requirements, the three key critical loads to be served are, first, nuclear power stations. They need sustainable electricity in order to shut down safely. Secondly, the natural gas infrastructure needs electricity to continue pumping. This is critical, because the electric sector is, in turn, heavily dependent upon natural gas. The third category, needed for black start is "hot-start" plants that have a cycle time of four hours or less.

External requirements needed from other sectors are more flexible and open to discussion. There is a large question about where "needs" shade into "wants."

"In the electricity industry, performance is usually assessed by reliability and efficiency; resilience needs to be added to this list."

Monken noted that in the electricity industry, performance is usually assessed by reliability and efficiency, and that acknowledged metrics exist for measuring success on these criteria. Monken argued that resilience needs to be added to this list, and raised the question of how resilience should best be measured. Acknowledged metrics for measuring resilience are extremely important for designing and implementing long-term resilience investment plans. Monitoring the returns on such investments requires broadly agreed methods of measuring resilience,

Special Presentation: "Electricity - Fuel Interdependency Challenges and Opportunities, and Black Sky Water Considerations"

Dr. Paul Stockton, Principal Author and Editor in Chief, EPRO Handbook II, Water and Fuel

Stockton stressed that as the interdependencies between the electric and gas sectors deepen, “the electric subsector needs to be ready to support natural gas operations. Increasingly, compressors are powered by electricity as opposed to gas offtake.” Another consequence of this interdependency is, Stockton argued, that “we need to ensure that dual-fuel generators are going to have prioritized distribution, above all else, for black-start generators that are dual-fuel...” This is a classic example of sectoral interdependency but also an opportunity for inter-sectoral support.

“The electric subsector needs to be ready to support natural gas operations. Increasingly, compressors are powered by electricity as opposed to gas offtake.”

He also urged bringing resilience and national security into regulatory discussions that have been dominated by environmental considerations. By way of example Stockton pointed to “regulations that are inadvertently driving the gas industry towards electric-powered compressors, as opposed to offtake gas, which to me has a lot more resilience.”

“We need to ensure that dual-fuel generators are going to have prioritized distribution, above all else, for black-start generation.”

**Kimberly Denbow, Director of Engineering Services, American Gas Association;
Chair of the Oil and Natural Gas Sector Coordinating Council**

Denbow discussed the Downstream Energy Coordination Program group that she leads for the Oil & Gas Sector Coordinating Council that promotes coordination between the electric and oil and gas sectors.

Supply chain integrity is the one thing that we have no control over. When you go to vendors or manufacturers and you ask them 'do you know the origin of all your parts, and pieces, and chips, and microprocessors,' and they say 'no,' how are we supposed to secure our systems?"

She stressed "the one issue that keeps the oil and natural gas sector up at night. And that is supply chain integrity. Supply chain integrity is the one thing that we have no control over," she explained. "When you go to vendors or when you go to manufacturers and you ask them 'do you know the origin of all your parts, and pieces, and chips, and microprocessors,' and they say 'no,' how are we supposed to secure our systems?"

Electric Sector Panel: Brief Black Sky Considerations for the Electric and Oil and Natural Gas Sectors

Facilitator: John Twitchell, EPRO Electric Subsector Coordinator, EIS Council, Former Electric Utility Executive and Power Systems Engineer

John Twitchell opened by posing some basic questions to the panelists; after a Black sky event,

“What are some of the key decisions that you will have to make? What is the information you will need to inform those decisions?”

“What are some of the key decisions that you will have to make? What is the information you will need to inform those decisions? What communications are required... what information are you going to exchange with other people in you organizations and perhaps other sectors of our industry? And what commands are you doing to issue? And who are you going to issue them to?”

David Roop, Director of Electric Transmission, Dominion

Roop outlined some of Dominion's emergency and resilience planning. He stressed that this represents a continuous effort for the company since 2005.

Roop emphasized the importance of achieving basic situational awareness in a Black Sky event and answering questions such as: "is this localized by area?" Is it regional? How large is the span?" This information is necessary, first so that the operating centers can begin to respond and staff can move to the key substations. Dominion has plans to communicate with staff in emergencies using emergency broadcast radios, so that they can move to their stations in a crisis within 30 minutes.

"Is this localized by area?" Is it regional? How large is the span?"

He noted that Dominion staff and partners are trained to give the highest priority in an emergency to moving emergency fuel supplies to nuclear plants so that they can be shut down safely. These plants tend to be in rural areas and transportation of their fuel supply will be very much dependent on government. Roop pointed out that government has not always understood the importance of safeguarding these emergency supplies.

Ropp stressed the special importance that Dominion places on ensuring resilient, diversified fuel supplies. The company aims to maintain supply from a range of different sources and geographical directions.

He concluded that resiliency of generating plants has not, historically been a high government priority. He urged that government embrace resiliency as a goal, especially in the design of energy systems. "We can incrementally improve resiliency in the development of our systems if we do it by design upfront."

Chantal Hendrzak, Executive Director, Market Evolution and Market Services, PJM Interconnection

Hendrzak reiterated the importance of achieving situational awareness after a Black Sky event. Some of the questions she would want answered include: “What is the status of the grid. That’s both from a generation, transmission, and load perspective. What generation is online or offline? What’s the status of our transmission system? What’s the status of load? Do we know where it’s up, where it’s down? The second thing is “what is the status of our tools? Are the telemetry and SCADA tools updating and giving accurate information?” This is ascertained at PJM by cross-checking between three different sources for the same information.

“What is the status of the grid? What generation is online or offline? What’s the status of our transmission system? What’s the status of load? Do we know where it’s up, where it’s down?”

The next important question would be the status of operation facilities. PJM has dual control centers that are fed simultaneously the same information, “so should one area be a smoking hole we don’t need to worry about a failover, but the other is operational.”

“What is the status of our tools? Are the telemetry and SCADA tools updating and giving accurate information?”

Next, it is crucial to ascertain the situation fuel supply situation the Black Start units, the status of neighboring grid interconnections and also of the natural gas system (30% of PJM’s power is generated from natural gas.)

Once these situational awareness issues are resolved, the recovery team can get to work and begin addressing questions such as: “Are areas down? Do we, in fact, need our black start units in some areas, or are other parts of the interconnection up and running and we can tie into them and start to rebuild the system. Do our neighbors need assistance?”

Discussion

Introducing the discussion, **John Hetzel** emphasized its cross-sectoral character. A central aim of the conversation would be to bring the perspectives and needs of other sectors to bear upon the electric sector's planning.

Wendy Smith Reeve from the National Emergency Management Association, declared that from a State Governor's perspective, the most urgent question in a prolonged outage would be how long will it continue? "how quickly can we restore, and if the answer is several months, then what are the plans that we are going to put in place to address that?" **Chantal Hendrzak** responded that this will be hard to predict in a Black Start where "you're trying to start up pockets of load and generation, and keep those in balance, where you can."

Jonathan Monken pointed out the difficulty in answering the governor's question about duration and extent of the outage: "if the tools we typically utilize to answer that question are not available to us, either because of damage to the system or failure of the communications network...the number one thing that we would need is assistance to get a status of our own system."

General Hayes stressed that the number one priority for his governor in such a situation would be saving and preserving life.

Session Two: The Electricity/Fuel/Water Nexus

Facilitator: John Organek, EPRO Water Sector Coordinator, EIS Council, U.S. Army Corps of Engineers (Ret.)

**Introduction: "Key Challenges and Opportunities for the Water Sector"
Dr. Kevin Morley, Security and Preparedness Program Manager, American Waterworks Association**

Kevin Morley pointed out that the US water system is highly decentralized. "There are some 52,000 community water systems across the US." For each individual community, the water system is, of course, a critical asset. However, from a national security perspective, these small-scale systems are not a high priority, which partly accounts for the under-investment in water sector resilience. This gap in prioritization between the national and local scale also affects the water utilities' relationship with the public. As Morley put it, the sector has to ask, "how do we condition the public to not be victims but survivors."

There are some 52,000 community water systems across the US.

Many of these community water systems are not equipped for prolonged power outages. Morley reported on his survey which found that around a third of US water utilities would be without power or fuel supply for emergency generators within 12-24 hours of a massive outage. Most do not have plans in place for resupplying fuel or essential chemicals. He also cited research showing that the water and waste-water have the highest levels of daily fuel consumption of all infrastructure sectors. The vital importance of these sectors demands that they receive higher prioritization from government emergency planners.

"How do we condition the public to not be victims but survivors?"

Congress is starting to understand the need for more investment in the water sector. Morley noted that "Congress just passed a program called WIFIA, Water Infrastructure Finance Innovation Act that allocated 20 million dollars, which given the water sector's low default rate, becomes leveraged to be about a billion dollars in loan capacity."

Morley ended by pointing out how major US cities would require different emergency water support in a widespread outage. A city such as New York, whose water systems is gravity fed would be in a better situation than, say, the LA basin where 25 million people are entirely dependent on pumped water. If the LA pumping system failed, 4000 tractor trailer loads of bottled water per day would be required to supply the population's needs.

Water Sector Panel: "Brief Black Sky Considerations for the Water Sector"
Nick Santillo, Vice President Internal Audit & Chief Security Officer, American Water

Nick Santillo surveyed America Water's emergency planning and backup plans for key resources such as fuel. While, he asserted, American water is "pretty good at managing the normal day-to-day power outages that happen, of 48-72 hours, outages lasting weeks or months would place a major strain on our supply chain logistics."

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One of the first supplies to run out would be stores of chemicals for purification that are held onsite. Water plants would soon need resupplying by the chemical sector, with support from the transport sector. Without chemicals, water could still be moved around for fire suppression, but it would not be of drinking water quality.

"How do we continue to have fuel supplies and tractor trailers of fuel coming in for both the large treatment facilities, the wastewater stations?"

Fuel supply is also a critical link. "How do we continue to have fuel supplies and tractor trailers of fuel coming in for both the large treatment facilities, the wastewater stations?" During Hurricane Sandy, American water required fuel resupply after a week. As a private company, it was not on the government prioritization list and had to contract privately for fuel from firms on Michigan and North Carolina. Santillo questioned this prioritization and warned that without fuel for his company to move wastewater, potentially disastrous mass migrations would result.

In conclusion, he stressed that the critical interdependencies for his industry involve ensuring supplies of fuel for emergency generation and chemicals for purification.

Peter Virag, Corporate Energy Manager, Aqua America

Peter Virag began by noting that the more advanced warning the utility can have of the size, location and nature of a Black Sky event, the more they can do to prepare, for example by prepositioning fuel supplies, or making available pumps and boosters to move water to particular, affected areas.

He observed that “gray sky” events like ice storms and hurricanes have given Aqua American good practice in coping with outages of 1-3 days, but acknowledged that “after an outage of 5-7 days, fuel would become a critical factor.” Stretching operations further would require the public’s cooperation in reducing water use, even while there was still water in the tap.

“After an outage of 5-7 days, fuel would become a critical factor.”

Virag reiterated that water plants are not prioritized in emergency planning and noted that in many places, “when you’re doing that initial triage of looking at who do I provide power to, utilities can’t even query their own database to see whether a wastewater treatment plant or water utility plant is on that list to help them prioritize restoration of services.”

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Virag ended by referencing the movie Apollo 13, in connection with the difficult task for emergency managers of achieving situational awareness after a Black Sky event: “Gene Krantz sits there, and everyone is yelling about what’s down. He says, “Well, okay, what’s working?”

Linda Warren, PE, CEO, Launch! Consulting

Linda Warren observed the enormous variety of water sources that people depend upon, from those in rural areas who have their own wells, to city dwellers who are entirely reliant on pumped water. She affirmed that most water systems would run out of fuel for pumping within a couple of days.

“How many of you can go without flushing the toilet for more than a day?”

Warren pointed out that culturally it is very difficult for Americans to go without waste water facilities. “How many of you can go without flushing the toilet for more than a day?” she asked. Warren also pointed out the importance of communicating with the public, for example about whether water is safe to drink in an emergency and how difficult such communication will be in a Black Sky scenario. There is a need for “Preemptive communication” to help people understand what to do in the event.

“It's very important that the emergency managers are working with the water utilities today, and also that the power companies and water are communicating with each other about where to bring water up first.”

It is frequently unclear, she noted, which Emergency Support Functions have jurisdiction over water. “It's very important,” Warren urged, “that the emergency managers are working with the water utilities today and also the power companies and water are communicating with each other about where to bring water up first.” She also reiterated that water must be prioritized according to its critical importance, “Because guess what? The hospital is not going to work very well if there's no water flowing.”

Discussion

The discussion focused first on the interdependencies between the water sector and the NGO sector, which would be heavily involved with providing mass care in a catastrophic outage. **Joe Wainscott** from the American Red Cross stressed the importance of caring for the families of NGO workers who would be leaving to perform emergency relief tasks. He also pointed out the importance of sustaining the medically fragile people who are able to care for themselves with home devices, but would head immediately to the hospitals if their water and power is cut off.

John Hetzel asked the panel about the viability of prioritizing certain water lines or areas. Most of the panelists opined that the emphasis needs to be on restoring the whole system, with some exceptions where prioritization is appropriate, such as hospitals, and nuclear plants which need water for cooling.

On the question of what the electric sector needs in order to restore power to water facilities, panelists spoke of the importance of knowing the loads that the restored power will be required to serve.

Addressing the endemic underinvestment in water sector resilience, **Kevin Morley** asserted that “where many utilities have 15% water loss from pipe leaks, there are investments that can lower water losses, increase resilience, reduce pumping costs and provide win-win results for all parties.”

On the role of regulators in relation to resiliency investment, **Gladys Brown**, Chair of the Pennsylvania Public Utilities Commission (PUC) first underscored the importance of having more money available for resiliency and then discussed the balance between resilience and ensuring that investments meet the standard criterion of being “used and useful.” **Dan Lauf** from the National Governors’ Association listed some of the key information that governors would want in a Black Sky event, including knowledge of restoration timelines and an understanding of what backup resources are available and how they can be deployed.

“In Hurricane Katrina, utilities used, a can of spray paint and a sheet of plywood at major intersections: ‘Do not drink water.’ That was how the message got delivered.”

Finally returning to the importance of communicating with the public, panelists discussed how this could be done in a Black Sky event where normal communications are down or damaged. **Kevin Morley** recalled, it that “in Hurricane Katrina, utilities used, a can of spray paint and a sheet of plywood at major intersections: ‘Do not drink water.’ That was how the message got delivered” NGOs can also deploy local networks to go knocking on doors.”

Session Three: Government

Keynote Presentations: Defense Continuity and Energy Initiatives; U.S. Department of Defense; North American Transmission Forum

Chuck Kozak, Deputy Assistant Secretary of Defense for Defense Continuity and Mission Assurance, Department of Defense

Kozak began his remarks on threats to US energy infrastructure by noting that: “the threat that we face from nation states as well as from international terrorist organizations is persistent and it's evolutionary.” He warned that, there are nation states “that are very adept at mapping our critical infrastructure, very adept at mapping our defense critical infrastructure.” These countries, he continued are not merely preparing for future conflicts. “They're doing things now that are affecting our national security.”

“The threat that we face from nation states as well as from international terrorist organizations is persistent and it's evolutionary.”

Alongside hostile nation states, there are international terrorist organizations attempting to direct or inspire attacks side the US. These actors are searching for the weak points in US defenses where they can inflict damage without facing the full might of the American army. The vulnerable places may include civilian and military electrical infrastructure.

Kosak pointed out that this vulnerability stems in part from the very complexity and diversity of the US economy. Russia's economy, by contrast is not diversified, but rather is heavily dominated by the energy sector. The interconnectedness of the US economy makes it vulnerable to attack. This asymmetry may make Russia less risk averse and more willing to escalate a conflict, which potentially leads to dangerous miscalculations. Other points of vulnerability include under-sea cable and private sector assets and infrastructure that affect the army's defensive capabilities.

Kosak noted that the Department of Defense has just adopted a Mission Assurance Strategy as official policy. He also mentioned a new initiative called Defense Critical Electric Infrastructure, which prioritizes the protection of civilian electrical infrastructure that has military significance. This initiative will necessarily involve partnering with utilities. Though the DOD will not be able to pay for resilience investments by the private sector it may be able to offer in-kind consideration such as renewable energy PPAs.

In conclusion, he urged ESIA to continue its important work in providing thought leadership on Black Sky events and highlighting the interconnectedness of lifeline infrastructures and to continue inviting US government entities to its valuable exercises.

**Michael McGhee, Executive Director,
Department of the Army, Office of Energy Initiatives**

Michael McGhee discussed the synergies and overlaps between the work of the Army's Office of Energy Initiatives and the resilience needs of civilian energy infrastructure.

The OEI is focused on increasing the army's energy security and resilience, principally by adding renewable power generation capacity. The army no longer uses exclusively off-grid sources and has privatized much of its generating capacity. Power production generally does not happen at military bases any more. Plants are usually privately owned, operated and maintained. These shifts have magnified interdependencies between the army and private utilities.

McGhee noted that the mission statements of utilities and other bulk power providers usually boil down to the three word mantra "Safe, reliable and affordable." He urged that utilities add the words "secure and resilient" to their missions. "I submit that those last two things have not been priced into the system," he added. "A chain-link fence and a keep out sign does not represent adequate security for the components that distribute power to where it's needed." Such measures are not adequate to address the threats posed by sophisticated, determined adversaries "who are going to mount a coordinated, multipoint attack to try to bring down the power system in large swaths... and who is going to not only try, but try, and try, and try again."

"A chain-link fence and a keep out sign does not represent adequate security for the components that distribute power to where it's needed." Such measures are not adequate to address the threats posed by sophisticated, determined adversaries "who are going to mount a coordinated, multipoint attack to try to bring down the power system in large swaths and who is going to not only try, but try, and try, and try again."

McGhee observed that there is a general trend in the industry towards smaller-scale distributed generation projects, both for natural gas-fired and renewable power plants. The army has recognized that this trend overlaps well with its need for more resilient energy sources. Modular, distributed and independent plants are more likely to survive a major attack on the power system. The army is therefore developing, together with private partners, 30-60 MW wind, solar, biomass and hydro plants in multiple locations. The plants are typically outside the perimeters of the army bases themselves, and often placed in locations that also serves civilian power needs.

Describing the development process for these plants, McGhee explained, "most of these have occurred in an opportunistic fashion. Someone wanted to invest money. We were there to receive it. We were there to facilitate the project that they wanted to build anyway. They were going to build it somewhere, and we said this would be a great spot."

Ed Ernst, Program Manager, North American Transmission Forum

Ed Ernst described the Spare Tire resiliency initiative being developed by NATF, which is an association of companies in the power transmission field. The project developed from efforts by power transmission professionals to define the key information needs, processes, protocols and tools that would be needed in a Gray or Black Sky event.

Some of the leading questions included, how long is the outage likely to last? How will the grid be operated if the EMS (Emergency Management Systems) and SCADA (Supervisory Control and Data Acquisition) systems were out? Which parts of the systems are affected? And finally, “out of the various tools that are embedded in those EMS systems, which of those things would you really need if you had to come up with a “spare tire” that you had to pull out and put in place to work for some prolonged period of time until you got things back to normal?” The concept of a “spare tire” developed as a minimal box of tools that would enable the system to run until things return to normal.

“Out of the various tools that are embedded in those EMS systems, which of those things would you really need if you had to come up with a ‘spare tire’ that you had to pull out and put in place to work for some prolonged period of time until you got things back to normal?”

Other guiding questions for the project include: How do I get people in substations? How are they to be trained for this event? What communication capabilities do I need to achieve situational awareness?

There are to be two main deliverables from the project. The first, nearly completed, is an education piece that lays out the primary backup capabilities and processes that exist in control centers throughout the country. The second, due to be developed in the first half of 2017 will outline the tools, capabilities and operating protocols needed to cope with a severe long term outage.

Commenting on Ernst’s presentation, **John Hetzel** noted that it would be very value for each sector to be able to articulate for itself and for the other, interdependent sectors what its “spare tire” – minimal set of operating tools - looks like.

Session Three: Government

Panel: Brief Black Sky Considerations for Federal Agencies and Departments

Facilitator: James Kish, EPRO Federal Sector Coordinator, EIS Council, Former Acting Assistant Administrator for Response, FEMA

Damon Penn, Assistant Administrator of the Response Directorate, FEMA

Damon Penn drew a distinction between a disaster and a catastrophic event. As Penn defined the difference, “with a disaster, sooner or later we will have enough stuff to fix it...if we responded to Hurricane Sandy with ten of something, then we will respond to Hurricane Matthew with twenty of something.”

In a catastrophic situation, on the other hand, the resources to address every need simply do not exist: it is scenario in which “there aren’t enough generators on the planet to do what we need to do.”

“With a disaster, sooner or later we will have enough stuff to fix it; if we responded to Hurricane Sandy with ten of something, then we will respond to Hurricane Matthew with twenty of something. In a catastrophic situation, there aren’t enough generators on the planet to do what we need to do.”

This implies that in a catastrophic situation, there will be very acute problems of prioritization. The three top priorities in disaster are life-saving, life sustaining and then assisting first responders. In a catastrophic situation, many who were the objects of life-sustaining efforts (such as those on dialysis and oxygen machines, will be in need of life-saving, while the resources available for life-saving will be fewer.

Penn also recommended that emergency workers avoid misplaced confidence when they make estimates of the timeframe for restoration after outages. “If you can provide that information and then give some idea of how much confidence you have in it, realizing initially you’re not going to have a lot of confidence... then I think that’s very helpful as well.”

Penn also opined that in a catastrophe, mass migration will be an inevitable result and so part of the challenge for government will be “to take things to where the people have gone versus where we think people are going to go.”

Brian Scully, Deputy Director for Strategy and Policy at Office of Infrastructure Protection, Department of Homeland Security

Scully described the two major types of decision that the Office of Infrastructure Protection makes. The first is prioritization. Scully explained, the issue here is, “how do we prioritize which critical infrastructure needs to be restored first? A lot of that is based on interdependencies, so which systems do we need to get back up online.” The OIP plays a role by supporting FEMA and emergency managers in deciding what infrastructure should be prioritized for restoration first.

“How do we prioritize which critical infrastructure needs to be restored first? A lot of that is based on interdependencies, so which systems do we need to get back up online.”

The other major area of OIP’s work in an emergency would be to help those not directly affected by the disaster. While FEMA handles relief within the disaster area, OIP assists those outside it to take protective measures ensuring that they are not affected by spreading or cascading effects from the main event.

OPI also has a role in establishing situational awareness though trying to understand, for example, how many people are affected by a power outage and when it is going to be restored. As well as working closely with FEMA, the OIP supplies information to the National Response Coordination Center and the State Emergency Operation Center to assist with those organization’s planning efforts.

Robert Welch, Deputy Regional Administrator for FEMA Region III

Welch reviewed the extreme challenges that FEMA (Federal Emergency Management Agency) would face in a Black Sky event, for example in supplying enough fuel for generators or transporting commodities such as food or water to where they are needed.

“We talked about crisis relocation planning. We talked about emptying the city out to West Virginia, and West Virginia said no, you're not coming, so it will not work.”

Having researched and discussed the option of organized mass migration during his career at FEMA, he ruled it out as an unrealistic solution. Welch recalled, “we talked about crisis relocation planning, where we were going to empty the big cities in the country to within two and three days, and people were going to migrate out. We talked about emptying the city out to West Virginia, and West Virginia said no, you're not coming, so it will not work.”

“In the absence of a credible, validated message, people will do what they want to do”

Turning to the importance of public messaging during and after a catastrophic event, he noted that the message would likely be coming from the White House or the DHS. “In the absence of a credible, validated message,” Welch warned that “people will do what they want to do” and anarchy would develop.

He stressed the importance of exercising and including the private sector in table top drills: FEMA has a regular exercise with Walmart, Target and Disney. Finally, Welch emphasized the importance of understanding what key stakeholders can bring: “what capabilities do some of our better states have already with respect to communications, or to fuel, or to hookups for generators.”

Discussion

John Hetzel sharpened the prospect of a Black Sky event, describing it as a multi-state-multi-region, no-notice event. Hetzel asked how FEMA would execute the extremely challenging prioritization necessary in this situation. **Damon** began by quoting the Director of FEMA, **Craig Fugate**, who said that “FEMA did what it was designed to do in Hurricane Katrina, but didn’t do what it should have had the capacity to do.” He framed the major challenge as being how to enable the population to take care of itself and the less badly affected to take care of those who had been devastated.

“FEMA did what it was designed to do in Hurricane Katrina, but didn’t do what it should have had the capacity to do.” (Craig Fugate)

Hetzel asked representatives from the NGO sector what help they would like from the federal sector. They replied that they based their emergency planning on the assumption that the federal government would not be available; only resources existing in their locality could be counted on.

Wendy Smith-Reeve from the state sector said that the most important thing the federal government could provide them with would be a timeline for restoration. The panelists replied that this would be difficult to define. On the issue of coordination with the private sector, planners described the benefits of devolving relationships with the private sector to the local level.

Session Three: Government

The EPRO State Sector

Facilitator: John Madden, EPRO State Sector Coordinator, EIS Council, Former Director of Alaska Emergency Management and Homeland Security

Introduction: Key Challenges and Opportunities for States

Wendy Smith-Reeve, Arizona Division of Emergency Management; Deputy Director, President, National Emergency Management Association (NEMA)

Wendy Smith-Reeve began by emphasizing that in emergency management, the response begins at the local level. Locally originating requests for assistance are then pushed up to the state and federal level.

“Emergency workers themselves who think they will be fine in a crisis, are sometimes not so fine.”

She noted that citizens will inevitably panic in a major emergency and that part of the task of the emergency services will be to calm them. Moreover, often emergency workers themselves who “think they will be fine in a crisis, are sometimes not so fine.” They too need to be helped to focus on finding solutions. The exercise is being shared with the membership of NEMA across the country

She reported that in 2013, the State of Arizona for the first time held a long-term power outage exercise, simulating a scenario of two weeks without power. 200 agencies participated. The lessons from the exercise are being shared with the nationwide membership of NEMA.

Smith-Reeve urged the audience to focus more on the difficult recovery process, which receives less attention than the initial disaster response. She challenged participants to work on enabling impacted communities to become more resilient.

Another major challenge is how to communicate in an emergency with affected populations, who may be highly diverse. She asked for a show of hands in the room as to many people have a 72 hours supply of emergency food and water in their homes. Since a number of the group, who work professionally on emergency response, did not raise their hands, she inferred that the message was not getting through to the wider public either.

Moreover, the task of communication is complicated when the population is likely to be panicked and stressed. “How do we communicate to them that it's going to be okay? How do we ensure that we have their trust and their confidence, that we're going to stabilize the situation, and they're going to be just fine -- but we need their active participation?”

Finally she emphasized that governors and other emergency responders need data that is, above all, raw and honest to ground their decision-making.

Panel Discussion

Brief Black Sky Considerations for the State Sector

**Dan Lauf, Senior Policy Analyst, Environment, Energy & Transportation Division,
National Governors Association Center for Best Practices**

Dan Lauf noted the National Governor's Association holds a seminar for newly elected governors, The short list of policy topics addressed in the seminar always includes emergency management and emergency response, since governors need to be able to address potential emergencies from their first day in office.

In addition to such training, it is also vitally important that staff who do not turn over in an election cycle are familiar have good plans in place that recognize a number of different possible contingencies with can be used to brief incoming governors and communicate to them the nature and importance of their roles in an emergency.

Maj. General Richard Hayes, Adjutant General, State of Illinois

General Hayes pointed out that while there is an immense network for mutual aid and collaboration in his state including some outstanding NGOs, they are not coordinated to work together in a Black Sky event. What is missing are channels and protocols for communication.

"There's compulsory service in the Israeli military. The resilience level of their population is amazing."

Hayes recalled being amazed on a recent trip to Israel at the extent to which the local population was involved with Home Front Command planning. He attended an exercise in Haifa simulating a sarin gas attack at a theatre in which members of the general public participated. "There's compulsory service in the Israeli military. The resilience level of their population is amazing." **Hayes** found it hard to imagine the American public taking part in an equivalent exercise – "it would freak them out," he observed. There is a lot of work to be done in educating the population how to be survivors rather than victims.

Hayes also reiterated the crucial importance of governors being able to speak to their people in an emergency in a way that inspires calm and confidence.

Discussion

Kimberly Denbow pointed out that while many correctly advocate for more tabletop top exercises to train governors and other senior state officials in emergency management, if media are invited then critical infrastructure managers may stay away as they do not wish to have vulnerabilities reported. “That’s just a screaming opportunity to finger point.” There needs to be another way of framing these collaborations. **Dan Lauf** agreed that often joint public-private exercises will be more productive without media present. As he put it, “you want freedom of information flow in order to really understand where the gaps are and where we can do a better job of helping one another.”

“You want freedom of information flow in order to really understand where the gaps are and where we can do a better job of helping one another.”

Several speakers raised the question of how constrained resources are to be allocated by federal government between states which all have urgent needs. It was agreed that while this a critical question with life and death implications, much work still needs to be done to develop a process and criteria.

Responding to a question about what measures a governor or a leader can take in a Black Sky event to preserve the confidence of the people that they’re making the right decisions, **Wendy Smith-Reeve** argued that the most important thing is to speak with honesty and integrity. **Dan Lauf** added that governors will need to provide the public with information in a way that is “regular and timely, so that – no pun intended - people aren’t left in the dark.” General Hayes declared that leadership is about instilling confidence.

Greg Forrester from NVOAD explained that in the more remote areas, the NGO and religious communities need to know that In a Black Sky event, the state and federal governments will probably not arrive for many days. We need a “very integrated, community-based recovery and resilience model.”

“Governors, once they understand the importance of these issues, can be really great conveners. They have authority over state agencies but they also have strong relationships with local governments, with the private sector, and are able to bring these critical parties to the table.”

Dan Lauf pointed out that “governors, once they understand the importance of these issues, can be really great conveners. They have authority over state agencies but they also have strong relationships with local governments, with the private sector, and are able to bring these critical parties to the table to begin joint planning, to discuss resource availability, and the availability of any backup generation that may be available, and able to be leveraged in the event of an emergency.”

Session Three: Government

The EPRO Regulatory Sector

The Road Ahead: Unique Approaches for a Diverse Sector

Miles Keogh, Laboratory Director, NARUC; Chairman, EPRO Regulatory Sector

Miles Keogh took issue with several points raised by other speakers. In response to the view that citizens need to be better able to support themselves in a Black Sky event, he opined that in disasters, “those who suffer most tend to be the people who, no matter how much they wanted to, could not take care of themselves.”

Those who suffer most tend to be the people who, no matter how much they wanted to, could not take care of themselves.”

He emphasized that utilities are public service corporations – regulated monopolies aligned with the public interest. This status requires that utilities sometimes accept responsibilities that are not profitable, such as making investments in resilience that may not yield a positive financial return. He cited the reluctance of Ukrainian utilities to invest heavily in cyber protection for the future even though the Ukrainian grid was temporarily shut down by a major cyber-attack in December 2015. If even the Ukrainians were not convinced by the need for protective investments to the grid, then, Keogh argued, the case for such necessary expenditures was even harder to make in many American states.

“I want to take us from a 7 down to a 4 in cyber preparedness... or from being able to withstand a 6 to being able to withstand an 8 on some other hazard.”

Keogh then addressed the need for sharper criteria and metrics for resilience investments. Regulators will only approve expenses for investments that the utilities can show need. It then becomes important to define need. In the area of prevention, Keogh proposed adopting a metric for the impact of Black Sky events similar to the Richter Scale for earthquakes. Utilities would then be able to respond to regulators, “I want to take us from a 7 down to a 4 in cyber preparedness... or from being able to withstand a 6 to being able to withstand an 8 on some other hazard.”

He also proposed that sectors should think about how “people who can't take care of themselves can go to a place where they can get water, where they can get safety, where they can get power.”

Finally, he challenged utilities not to think in terms of all-or-nothing models of restoration. “Just get us through the worst 30 days of the event,” he urged them.

Joe McClelland, Director, Office of Energy Infrastructure Security, FERC (Federal Energy Regulatory Commission)

McClelland began by stating that for him, the most important takeaway from such meetings is that “we must have actionable steps that we take and then we self-assess, and we measure our progress against those steps. Otherwise, we just continue to admire the problem.”

“We must have actionable steps that we take and then we self-assess, and we measure our progress against those steps. Otherwise, we just continue to admire the problem.”

He explained that FERC is addressing the threat of specific Black sky events by developing “not only a regulatory approach to establish mandatory and enforceable standards, but also a voluntary and collaborative approach whereby we provide rate recovery, a cost recovery.” This cost recovery frameworks can also apply special rates to utilities that address particular threats.

McClelland proceeded to lay out five steps in the best-practice process of FERC’s work with utilities.

1. Identify the most critical facilities. For example, what are the gas pipelines that are most critical not just to gas service but also to electricity generation
2. Collect threat information from partners. What are the current threats? What are the current cybersecurity campaigns that adversaries using? What are the latest cyber tricks? This knowledge enables FERC to develop and share mitigation practices with partners.
3. Conduct vulnerability assessments. This may include among other things sending a cyber assessment team to a utility, looking at the firm’s cyber architecture to probe vulnerabilities and carrying out situational awareness assessments.
4. Share tools and intelligence. FERC shares tools and intelligence from D of E, DOD and DHS with the utilities
5. Help utilities to develop recovery plans

McClelland judged that there are some two dozen utilities that operate the most critical assets. These could cause cascading losses, regional or inter-regional outages, loss of power to nuclear plants or critical defense facilities. He estimated that the knowledge that such facilities are hardened would exercise a deterrent effect for adversaries.

Enumerating some of the largest current challenges, he listed: “how are we going to get information on supply chain? Access to intelligence; how is the industry going to know that an advanced adversary is in their system? What sort of threat indicators do they need, and what sort of equipment do they need to help find those adversaries?”

He concluded by praising the good work of EIS Council in raising awareness of the EMP and GMD threats, but cautioned that mitigation measures against them are only beginning to be implemented.

Session Four: Saving and Sustaining Lives in Black Sky Scenarios

The EPRO NGO Sector

Introduction: Key Challenges and Opportunities for NGOs

Facilitator: David Maxwell, EPRO NGO Sector Coordinator, EIS Council; Former Director of Arkansas Emergency Management and Homeland Security

Introducing the panel, David Maxwell declared, “there's one thing that I know for an absolute fact, and that's that our response and recovery system will fail without volunteers.” Maxwell proceeded to thank all those who offer their time for emergency-related services, from volunteer firefighters to those preparing meals in local churches.

“There's one thing that I know for an absolute fact, and that's that our response and recovery system will fail without volunteers.”

Greg Forrester, President and CEO, National Voluntary Organizations Active in Disaster (NVOAD)

Forrester briefly reviewed NVOAD's involvement in state and federal emergency response. He noted that none of NVOAD's 72 member organizations plan for a long-term power outage. He told the audience, “we're counting on the fact that all of you are going to do what you say you're going to do, and bring us back online.”

He described how, although the member organizations are all national, the basic level of response

“When you know each other, you can respond together.”

and training is local. It is critical that each organization in every state and community knows what capacities exist in the other organizations in their community: “when you know each other, you can respond together,” Forrester emphasized. While affirming that shelter in place is ideally preferable, Forrester warned that people “are going to move whether we want them to or not.” The voluntary organizations can respond by setting up points of distribution around the country for the most vulnerable populations. The Red Cross sheltering system, which is part of FEMA's national sheltering system, already does this. How long the voluntary organizations will be able to maintain such services in a long-term outage is unclear.

Forrester concluded by pointing to the wealth of skills and experiences among voluntary organization members. They doubtless include engineers and former utility workers who could help with the task of restoring the grid.

Joe Wainscott, Division Director, American Red Cross

Wainscott said that among the biggest challenges that NGOs would face in a Black Sky event were problems of communication and understanding the scope and scale of the event.

He emphasized that, while systems are important, the Red Cross's primary focus is on people: "how can we take care of our people? How can we best help them help themselves?" For the Red Cross, a crucial dimension of resilience is in helping people become more resilient.

"How can we take care of our people? How can we best help them help themselves?"

In this connection, Wainscott expressed his admiration for the people of Israel for the levels of communal resilience that they have achieved through decades of dealing with home front emergencies.

He also discussed the NGOs dilemma of whether to prioritize help for urban areas because the highest population densities are found there, or whether to focus help building resilience in rural areas because, they are going to be among the last to receive help.

Randy Garrett, Director of Disaster Services for Arkansas Southern Baptist Convention

Garrett stressed the importance of partnerships with voluntary organizations in other states. Although Arkansas Southern Baptist Convention has 83,000 volunteers, if a major disaster exhausts the state's food and water resources, the organization will not be able to continue helping the needy unless it is resupplied by partners in neighboring states.

“Communications is the number one key to making anything work. If you can't talk to each other, and you don't know who to talk to, then we've got problems.”

He asserted that “communications is the number one key to making anything work. If you can't talk to each other, and you don't know who to talk to, then we've got problems.” While he himself has a satellite phone, he acknowledged that in a major emergency, all of the satellite phone channels in Arkansas would be overwhelmed.

“I challenge this group to come up with a communications plan both for national and local partners, because in a Black Sky event, without communications we can sit here and talk about things, but if you can't communicate to each other, then nothing's going to happen.”

Garrett ended by issuing an urgent challenges to the audience: “I challenge this group to come up with a communications plan both for national and local partners, because in a Black Sky event, without communications we can sit here and talk about things, but if you can't communicate to each other, then nothing's going to happen.”

Discussion

In the ensuing discussion participants emphasized the importance of integrating the NGOs into the planning and training of other state-wide emergency responders. The dedication of the NGOs is remarkable, yet at the same time they need more training to be equipped to respond effectively to a prolonged, widespread power outage.

Among specific suggestions raised for inclusion in EISC's NGO Playbook under preparation were:

- Government agencies should help to promote volunteerism, to boost the numbers of community volunteer responders available.
- Make sure that utility employees and other emergency personnel have a disaster response plan for their families. Until people know their families are ok, they will probably not be responding to wider community.

John Hetzel posed three questions to the panelists about their NGO's response to a Black Sky event. What are the first couple of decisions that you or your organization need to make? What information do you need to be able to make that decision? Who do you plan on communicating that to?

Joe Waincott responded that he would need information on the scope and scale of the disaster and how many of his volunteers were in the affected area and might not be available to respond. This information would help him make decisions on what resources he would need to bring in, how to get them to the site, and how to sustain them once they arrived.

Greg Forrester answered that essential information would include knowledge of what the edges of the affected zone are. He would then need to make an assessment of resources that he had around that in concentric circles. Next, given that population will move out of the affected area, he would have to find a way to move them further away from the Black Sky event. There would need to be an assessment of NVOAD member organizations to assess where they have mass sheltering opportunities? Where are camps and facilities located that could take in large populations?

Randy Garrett concluded by emphasizing that the NGOs need to help provide three things to sustain life: shelter, food and water.

Looking Ahead: Closing Presentations

Gen. (Ret.) John Heltzel, Director of Resilience Planning, EIS Council

EARTH EX Overview: Unique Challenges and Opportunities for Black Sky Exercises

Introducing the EIS Council's EarthEx exercise, **John Hetzel** began by noting some of the distinctive features of Black Sky that require focused exercising in preparation for such events. Firstly, the broad scale of the impact means that emergency responders will be overwhelmed. External resources may not arrive for 3-5 days, or possibly longer. So exercises need to take that into account. Secondly, public messaging take on special importance' actions that you would want the public to take – or not to take - assume life and death significance.

EarthEx (Emergency All-Sector Response Transnational Hazard Exercise) is planned to be a multi-year, multi-sector exercise series, kicking off in 2017. The exercise will be framed around a long-term power outage. It is designed for senior executive and operational management teams across all sectors. Major private sector players such as Walmart are also set to participate.

The emphasis on cross-sector information flow makes the exercise unique. EIS Council will provide framing scenario injects and updates from the whole range of sectors that would impact each sector's planning and decision-making.

The three major phases of the exercise will be situational awareness assessment, decision-making and communications (not primarily in the sense of communication technologies, but rather the issues of whom managers would need to communicate with, when and about what.) More specifically, Hetzel explained, "Phase 1 will be a period of uncertainty and gaining awareness. Phase 2 will put you into a matrix where you have to make essential decisions to save lives, sustain operations, and protect property. Phase 3 be a series of cross-sector coordination events. No sector stands by themselves. Phase 4 will be an AAR, (after action report.)

"The objective of EarthEx is to improve community resilience to long-duration power-outage events through cross-sector exercises... We're going to give you the opportunity to take your plan and test it. We're not going to write your plan for you."

Hetzel emphasized that the exercise is self-assessed. "The objective of EarthEx is to improve community resilience to long-duration power-outage events through cross-sector exercises... We're going to give you the opportunity to take your plan and test it. We're not going to write your plan for you."

The planning process for EarthEx includes three planning conferences staged between February and June, culminating in the first EarthEx exercise itself on 23-4 August.

Hetzel also highlighted EIS Council's sector playbooks series that is undergoing continuous improvement and refinement based on extensive consultation within and between sectors.

Looking Ahead: Closing Presentations

Highlights and Lessons Learned from EPRO Sector, Winter 2016

Terry Boston, EPRO Sector Executive Committee Chairman; CEO Emeritus, PJM

Terry Boston drew out the major highlights and lessons from the day's discussions.

- The Air Force's planes are no longer powered only by jet fuel. Electric-powered drones play an important role and so a reliable power supply is crucial
- Utilities are developing EMP action plans soon.
- The emergency spare transformer program that the industry EEI has worked on is coming together with Oakridge National Lab and DOE.
- There's a Power Outage Annex to the National Infrastructure Security Plan
- Asymmetric attacks are likely. The US must protect land, sea, air, space - and cyberspace.
- At PJM, gas capacity just exceeded coal-fired capacity for the first time in history. We need coordination between natural gas supplies and electricity.
- Water is essential for life. "The one scary thing I heard today is there are 52,000 water city, municipal, and private water companies - a big number to coordinate."

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- "The fact that it took three days to get water after hurricane Matthew hit North Carolina is scary to me. There's a risk to loss of life very quickly thereafter."
- "The one thing that will produce mass migration faster than anything else is sewage backing up in your basement."
- Taking care of the families of emergency workers is essential.
- The life of bottled water is only a year. "Water is going to be the number-one priority as we think about how we develop a six-month plan for a blackout."

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- In disaster, enough of certain resources will be ameliorate the suffering. In a catastrophic event sufficient resources for relief do not exist, so painful choices need to be made.
- "Mass migration will not work. As the Governor of New York puts it, I have 8.5 million people in Manhattan and New York boroughs. Where would I put them?"
- Power industry people need to be represented in state emergency management committees to champion the importance of power restoration.
- More and larger emergency generators are needed; 1000-2000 MW are required in all.

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- Potable water and waste water treatment plants in particular need larger generators. “The generators are small. The wells are deep.”

“Mass migration will not work. As the Governor of New York puts it, I have 8.5 million people in Manhattan and New York boroughs. Where would I put them?”

- NGOs make a vital contribution to disaster relief and recovery.
- Communications systems: In Hurricane Sandy, most cell-phone towers were lost. During Hurricane Katrina it took four days to install a temporary communication system. Without communications, recovery is seriously hampered. EIS Council’s proposed emergency communications system is badly needed.
- Coordination between sectors requires continuous effort and improvement. Currently eight sectors are involved in EIS Council’s work. There is a need to add another three or four.
- Water and power utility representatives should participate in state emergency planning exercises.
- The National Guard should establish cyber teams; national defense forces can assist utilities in cyber response.

“We need to be thinking about tapping the Department of Defense federal resources earlier in the game... lost time means loss of life.”

- The Stafford Act, (which grants state governors the power to initiate disaster response) even though it was modified after Katrina, needs to be revisited. “We need to be thinking about amending the Stafford Act-- tapping the Department of Defense federal resources earlier in the game... lost time means loss of life.”
- Emergency responders: there should be a checklist for communicating back to the linemen, electricians, and National Guard people that their families are okay, have food and have water.
- The transportation sector needs to join the EIS EPRO group. Transportation is critical for a number of other sectors, including moving replacement transformers to help restore power and, of course, food: “Do you know how many trucks it takes to feed 8.5 million people in New York?”

EPRO SECTOR, Winter 2016 Concluding Comments

Avi Schnurr, CEO and President, EIS Council

Avi Schnurr concluded the day by thanking all the participants. He noted that, although Black Sky hazards are unique, “if you prepare for a Black Sky hazard that means by definition you're going to be way more capable for other disasters.” He announced that the next EIS Summit would take place on July 24-5 at the Capitol Building in Washington DC.

“If you prepare for a Black Sky hazard, that means by definition you're going to be way more capable for other disasters.”

He also noted that there had been a lot of discussion about emergency communications during the day. Schnurr highlighted that the team that designed the system the army uses for their field communications put together a plan for emergency communications linkage across all of the different sectors, to interlink and interconnect all of the sector emergency communications systems.”

Through this program, led by EIS Council, Schnurr noted that there is a great deal of interest in the system, which could provide a national capability. The system, known as BSX should be ready for prototype testing this year as part of the GridEx IV exercise and EIS Council's EarthEx exercise.