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A Model of Resilience:

Waldo County Maine's Off-Grid Emergency Operations Center

BY KYLE SHIDELER

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Introduction

Waldo County is an idyllic New England community in the Midcoastal region of Maine. At first glance, it seems an unlikely location for some of the country's most cutting-edge innovations in emergency management planning and resilience.

Consisting of 853 square miles and with a population just under 40,000 people, Waldo County has a population density of 46 people per square mile. A "bedroom county" the majority of Waldo's citizens work in and around Bangor in neighboring Penobscot County, the state's third largest city with more than 30,000 residents, or in one of the other smaller cities outside of Waldo County.

Waldo has built a robust county emergency management program that incorporates public and private sector actors utilizing both time-honored Civil Defense concepts and an all-hazards approach.

It is also home to what may be the country's first county-level Off-Grid Emergency Operations Center, designed to resist –and outlast – a prolonged power-outage, whether resulting from a severe winter storm or hurricane, from solar weather, or even an electromagnetic pulse attack.

The operations center is the brainchild of Lt. Col. (Ret.) Dale Rowley, the director of the county's Emergency Management Agency, a position he has held for nearly 18 years. Previously, Rowley served almost a decade as Waldo County EMA volunteer deputy director, as the EMA director for the Town of Thorndike, as well as the Emergency Management Officer for the Maine Air National Guard. A civil engineer by training, Rowley served in the U.S. Air Force and Air National Guard for 22 years.

A member of the Center for Security Policy's *Resilient Communities Network* (RCN), and a long-time participant in the *Secure the Grid* Coalition, Rowley firmly believes that widespread prolonged power-outage is the most serious potential threat facing his county.

"The greatest consequence we have from any of our

hazards, is the long-term loss of power. We've had floods. Nobody dies, but we have road damage. We have oil spills. Nobody dies, but we clean up the mess. We have some real emergencies, some of them are million-dollar emergencies," Rowley stresses, "But they aren't threats to our society, or our ability to operate, like widespread, long-term loss of power."[1]

That logic formed the basis for the creation of an off-grid capable operations center for the county's Emergency Management Agency. "You must have some place that can say, 'We're still up and running. We are going to try and get everybody else back up and running.'" Rowley notes, "We're trying to make sure that this [Emergency Operations Center] can operate indefinitely, in the event of a grid-down situation."

Building an Off-Grid Emergency Operations Center (EOC)

Now located on county-owned land between the Town of Swanville and the county seat of Belfast, the idea for an Off-Grid Emergency Operations Center (EOC) was already percolating in Rowley's mind, even while his agency shared space with the County Sheriff. "You have to already have in mind what you want to do, and what's going to be required," he suggests, "so that when a funding stream becomes available, you can say 'I've got a plan.'"

Funding and Construction Principles

For Waldo County, that funding stream came from the American Recovery Plan (ARP). The $1.3 trillion federal stimulus package provided local and state governments with compensation for the loss of tax revenue resulting from lockdowns during the COVID-19 Pandemic.

The Waldo County government—run by a three-person county commission—showed fiscal responsibility in electing to use the windfall grant to help with a series of capital improvements the county needed, and which would benefit them in years down the road long after the stimulus money was spent. Each county department was instructed to come prepared to discuss their wish-list. In selling his proposal, Rowley emphasized how the off-grid EOC would be located on underutilized land the county already owned and would free up key office space for use by the District Attorney's office, and the growing Sheriff's Office.

Additionally, the new EOC site was adjacent to the Swanville Reentry Garden, a program of the Maine Coastal Regional Reentry Center, a recidivism reduction organization that works closely with the county's corrections department. The garden is tended by the MCRRC's residents, incarcerated men who work the land as part of the program and which produces up to 120,000 pounds of produce every season for community food pantries. Locating the EOC nearby would provide added benefits to both organizations. Rowley stressed that the Off-Grid EOC would create a "home base" for multiple capabilities, ranging from a place the local amateur radio club could operate, to a place volunteer firefighters could conduct trainings.

Through the use of solar power, the system Rowley proposed would not only provide power to the EOC in the event of an outage but would actually lower the county's overall power bill at their other facilities.

The commissioners agreed. The project's overall budget was $2.5 million. The project included a new EMA office and food warehouse.

It does not take long in talking to him, to establish that Rowley by his nature is a frugal man with a do it yourself streak. Using his civil engineering experience

Figure 1. The Waldo County Emergency Operations Center blends in with the terrain as just another farmhouse and outlying storage buildings, where it sits adjacent to the Swanville Reentry Garden.

to act as the county's project manager and serving as general contractor on the build enabled Rowley to bring the project in $1 million under budget. "We saved over 25% on materials," he notes, although he realizes there are tradeoffs in managing construction in house. "Building [the EOC] did require putting some things on the back burner for a while," he admits.

In keeping with the nature of the Treasury Department-run ARP funds, which were intended for economic recovery, Rowley worked hard to ensure that contractors and vendors to the project were as local as possible, nearly all of them based within 20 miles of the selected site. But even in this Rowley had an underlying, off-grid motivation.

"In an emergency impacting the whole region, am I going to be able to get a repair crew to come in from some big company in Boston?" he asks rhetorically. "By

contracting locally, I can actually go down the street and get help, from the guy who installed the original system." As an added benefit of working locally, the EOC blends in well with its surroundings, looking like nothing quite so much as just one of several quaint Maine farmhouses that dot the landscape, albeit one with a significant radio tower.

Rowley's frugality extended to the nature of the building's EMP protections as well, avoiding over-engineered solutions in favor of multiple redundancies and practical resilience.

"We determined pretty quickly that we couldn't afford to just EMP-shield the whole building," he says which he estimates could have increased the cost of the project by almost 10x. "Why do you need to protect spaces where you don't have anything vulnerable?" The focus instead was to determine how best to

Figure 2. Director Dale Rowley shows CSP president Tommy Waller the operation center's Sol-Ark inverters. These inverters provide the EOC with sufficient power, and actually reduce the county's monthly energy bill while helping to provide off-grid capability.

shield key systems, especially power and the center's communications room. "We realized what we needed to do instead, was protect the stuff inside," Rowley says, "we know it's not going to be perfect, but every level of protection you can build in helps."

Resiliency Features of the Waldo County Emergency Operations Center

Power

Preparing to address a potential long-term power outage scenario, regardless of the cause, requires that the EOC itself can function without the existing power grid for a prolonged period. Waldo County EMA's approach throughout is in line with the best practices recommended by the Department of Homeland Security, as published by CISA's Resilient Power Working Group (RPWG) in November of 2022.[2]

The EOC's primary power is from three 15 KV Sol-Ark inverters. Sol-Ark inverters are designed to be protected from EMP, although only the company's smaller residential inverters are formally certified as such. Rowley says that while the commercial-grade system is designed the same way, the company simply hasn't gone to the expense of formally certifying it yet. "It's a bigger model than what they certify," Rowley says, "but it's the same thing."

The solar power system also helps defray other costs as well, not just for the Waldo EMA but for the entire county government.

"Right now, 10 months out of the year we will be producing three times as much electricity as we're using," Rowley explains, while the remainder of the power is sold back to the electric company and the costs used to lower the power bill at other county buildings.

In the event the sun isn't shining, Rowley says the Center's three Fortress Power E-Vault Max 18.5k Wh Lithium Iron Phosphate batteries give them approximately a week's worth of power when fully charged. Renewables, together with a battery energy storage system (BESS), are recommended by the RPWG as part of a multi-generation microgrid system:

> Renewables are often implemented to save fuel costs and for environmental reasons, but renewables combined with a battery energy storage system (BESS) can significantly improve resiliency in a microgrid by extending the fuel supplies during a long-term power outage. During a power outage, the renewables can at least intermittently provide power and enable operations after fuel supplies are depleted and more fuel cannot be delivered.[3]

The Waldo County EOC is not responsible for providing power to computer servers or other devices which would require a hardened Uninterrupted Power Source (UPS), in addition to a BESS, according to RPWG best practices. The main electrical system is also equipped with built-in surge protection devices to protect against both natural lightening and nuclear EMP. The Waldo County EOC has an inline-EMP filter attached to the main power supply. Additionally, ferrites, passive electronic components which can suppress high frequency signals on a power supply line, are attached to lines coming into the circuit panel from commercial power. Ferrites can be used to suppress some of the voltage saturation associated with nuclear EMP, but also help counteract high-frequency electronic noise, which can otherwise interfere with the EOC's radios.

The building is also prepared with a standby 32 kW propane generator, utilizing stored propane fuel and operating on an automatic transfer switch. "An average propane tank for a building this size is 500 gallons," Rowley explains, "we have three 1000-gallon tanks. We figure we can go two years with the propane we've got in there."

The building is equipped with a manual override transfer switch as well, which would allow Rowley to route power into the building from additional stationary and portable generators utilizing either gas- or diesel-powered generators (Waldo County EMA has both types of generators on hand). Oil and air filters to support maintenance to the generators are stockpiled on site.

The Waldo EOC is able to utilize propane as its primary back up generation because its power needs are significantly below the 150 kW level, above which the RPWG does not recommend natural gas or propane as a primary backup. In any case, multiple fuel sources, which the Waldo County EMA utilizes, are always preferable to single source generation. The generators are covered with a RF-blocking fabric cloth cover to protect them from potential damage in the event of an electromagnetic event.

Rowley deliberately kept the building's power draw low in the design of the building. For example, in Maine where the annual number of days when the outside temperature rises above 80 are very limited, the building has no power-hungry A/C system, relying instead upon several large built-in fans for cooling. Heating on the other hand is essential in Maine, and is provided by the EOC's main propane boiler system, with back up heat provided by a wood-fired cook top. Wood stove heat is common for homes in Maine, the country's most forested state, but it is an innovative

Figure 3. Amish-built wood-fired cookstove provides secondary heating and cooking capability. Many Maine houses utilize wood stoves for supplemental heating during the state's long winters.

approach for government buildings. Rowley came up with the idea after an ice storm caused the EMA's previous office to lose power, only to have an ill-timed generator failure. Rowley recalls, "So for the rest of the storm, we're operating in the office in the dark, in the cold. And I'm thinking, I've got a wood stove at home, but I don't have one here." Through its development of a load-shedding plan, Rowley figures the Waldo County EMA could double the amount of time the agency could operate with its existing fuel reserves.

Communications

Communication is central to emergency management work. Protecting and maximizing the effectiveness of the center's radio systems has been central to the entire Waldo County EOC build, from the antennas at the top of the tower, to the lightbulbs illuminating the operations center. During construction, Rowley emphasized a building that would reduce radio interference as well as protect against electromagnetic pulse. For example, as part of the load-shedding effort, the EOC does not utilize electronic automatic doors for its vehicle bay. This both reduces power draw while simultaneously eliminating a source of radio interference. Because some LED lights can produce HF radio interference the EOC's lights were tested by the Waldo EMA staff before installation.[4] The added benefit of reducing RF interference can be a useful selling point in justifying the need for EMP-shielding wiring and electronic devices.

Reducing radio interference is crucial since the EMA operates radios on every conceivable frequency. "We can communicate with public safety, fire police, EMS and all that," Rowley explains, "but we'll also have every type of amateur radio capability out there from HF, to VHF, to UHF, to digital mode. We have GMRS, Marine Radio, FRS. We're also putting in CB radio. Through these frequencies we'll able to talk directly to the public, so if 911 is down, they can call us." (Utilizing amateur radio organizations and other non-governmental groups for preparedness will be discussed further in another section). The Waldo County EMA also maintains a low-power AM broadcast radio transmitter, which can be powered-up in an emergency to communicate directly to the public.

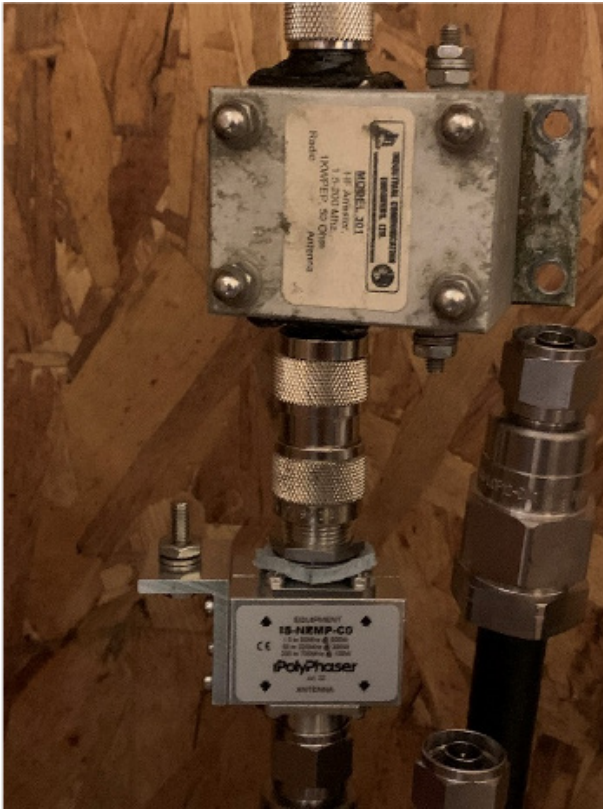To protect these critical communication capabilities from power surges, Rowley has installed shielded

Figure 4. Placed sequentially, these filters are designed to protect radio equipment from potentially damaging electromagnetic surges.

power cables and lots of grounding. The radio room is served by its own electrical subpanel, which can be rapidly shut down by radio operators.

"The initial thought was, do we protect our radio room antennas for lightning or for EMP?" Rowley explains, "and I said, why don't we do both and the radio operators said, 'because they don't make one for both.'" Rowley asked the ham radio operators to install the devices sequentially on the antennas coming into the building, in order to get the benefits of both surge protection systems.

Per Waldo County EMA policy, every radio is switched to a "dummy load" while not in operation, allowing the radio to be disconnected from antennas

which could receive an electrical surge and damage the equipment.

Much of Rowley's strategy is based on redundancy. Multiple spare radios for every frequency band have been secured and are stored in specially purchased Faraday cases (which look like regular pelican cases but are designed to be EMP-protected). The relatively inexpensive system – hand-held public safety radios, extra FRS and GMRS handheld radios, and spare radio batteries – are stored in shielded metal gasket ammo cans, serving as a kind of self-made Faraday case, or in Faraday bags. Stockpiles of shielded coaxial wire are kept as well, and when tower antennas are periodically replaced, the older but still functional antennas are saved and secured in the same sort of protection. Rowley and his chief radio technician are both trained and certified tower climbers, enabling them to climb and repair antennas on any of the county's six tower sites if necessary.

The County EMA office also has a handheld Iridium satellite phone which is also stored in a Faraday bag. EMA also stores a non-internet connected laptop computer and an external hard drive with all of the EMA digital files in a Faraday bag, with the drive being updated weekly.

Food & Water

The Federal Emergency Management Agency (FEMA) continues to recommend citizens be prepared for up to 72 hours without assistance in the event of an emergency, although some FEMA materials call for up to two weeks of individual preparedness. Recommendations for local government continuity of operations (COO) and continuity of government (COG) preparations likewise only extend to about 30 days. Rowley stresses a longer duration preparedness for both Waldo County citizens and staff. "We had a

Figure 5. Waldo EMA Director Dale Rowley demonstrates the manual pump capability for the EOC's well. In background can be seen the three 1000-gallon propane tanks that provide off-grid heat and back-up power generation capability.

storm in December, and it took five months to even get it declared a federal disaster. That means five months before help even starts coming [from the federal government]." he explains, "I have tried to instill in our people the idea that the cavalry isn't coming."

Waldo County EMA is focused instead on a "for the duration" approach, which requires additional preparation, such as insuring access to food and water, both for staff and citizens. Like most buildings in the county, the Waldo County EOC is on a well system, powered by the building's microgrid. But as yet another redundancy, Rowley installed a back up manual pump to ensure the building could get access to water even with no power.

The Waldo County EMA keeps an initial store of freeze-dried meals on hand to feed the staff in the event of a long-running emergency operation and is working to develop an emergency supply for the public to "keep things going until we can see if other supplies are coming," Rowley explains.

To help distribute aid to county residents in an emergency, the Waldo County EOC is equipped with a modern storage warehouse designed with a loading dock to accept tractor trailers and refrigerated trucks. That way, as relief supplies begin to arrive, they can be brought to the county EOC, and then parceled out to local town EMAs for ultimate distribution to those in need. "This is our county staging area for disaster logistics," Rowley explains. He laments that many others do not see the necessity for a logistics capability of this kind, but for Waldo County, the building has already proven its worth. In cooperation with the Swanville Reentry Garden, food destined for community food banks can now be stored on site at the Waldo County EOC and then redistributed as appropriate, saving volunteers substantial time and effort.

For many county EMAs, distribution of community food assistance was not a top priority until the prolonged COVID-19 emergency brought the issue front and center, with demand for food assistance rising as much as 40-50% in some areas, straining volunteer and emergency resources.[5]

As emergency officials at both the federal and local level learned during the COVID-19 emergency, one of the challenges to food distribution can be the lack of access to shelf stable food items.[6] To combat this issue, Waldo County EMA invested in a commercially available freeze-dryer to convert fresh produce and other potential food donations into shelf stable supplies. In the event of a long-term emergency this would

Figure 6. CSP President Tommy Waller inspects a pallet of shelf-stable food stored on-site at the Waldo County EOC. The logistical capability to receive and then redistribute food aid is a crucial capability for prolonged disasters.

also help the county take advantage of the Swanville Reentry Garden's ability to supply up to 120,000 lbs. of produce a year, ensuring food resources aren't lost. In the event of a prolonged, widespread power outage it may also enable the county to preserve food resources which would otherwise be lost due to lack of refrigeration.

Integration of Mobile Command into Off-Grid Concept

Mobile incident command is also an important part of emergency management, and here too the county has benefited from Rowley's frugality. Specially built Mobile Command Center vehicles can cost a county hundreds of thousands of dollars. Waldo County EMA spent just $40,000 to convert a commercial bread truck into a Mobile Command Post, featuring the EMA's extensive VHF/UHF radio capability (including an aviation radio), a portable repeater, along with the necessary antennas, and two linked 2kW portable generators to power the equipment. A copy of all necessary emergency plans are kept

in hardcopy, pre-staged within the vehicle, includes detailed plans for dealing with emergencies at any of the county's critical infrastructure entities.

Mobile Command Post laptops are stored in faraday cases, and hard drives are backed up and shielded as well. The Mobile Command Post also stores a pre-packaged case for each position in the Incident Command System, with a variety of necessary tools for each position ranging from pens and paper to a backup hand-crank flashlight contained within. "Everything they would need to do the job. We've found that the number one tool on any incident… is a clipboard," Rowley says.

Most materials Rowley acquires from Maine's state surplus system, allowing him to cheaply acquire an extensive stockpile of these basic items. When not in use the vehicle remains plugged into the building's power, to ensure that the minimal power draw from radios and other electrical equipment doesn't sap the MCP's battery.

Figure 7. Waldo County EMA acquired this former bread truck and extensively overhauled and upgraded it to create a low-cost, high-capability Mobile Command Post.

Building a Resilient County

Fundamental to the emergency management process is planning.

"One thing we've learned is the general public has no interest. They're floating through their life on a happy cloud," Rowley says, "So what we're trying to do is build plans in place so when something happens and they say 'oh my God what do we do?' Well we've got the plan."

Waldo County EMA has prepared a Long-Term Power Outage Annex to the County Emergency Operations Plan and has updated its hazard and risk assessment to include potential blacksky events and is in the process of developing a county black sky long term recovery plan.[7]

But to execute such plans, Rowley knows they'll need help. As proud as Waldo County EMA is of their newly constructed Off-Grid Emergency Operations Center, the first, and last, line of defense for emergency management is people, not materials. It is therefore necessary to prepare and equip as many citizens as possible with the skills and tools necessary to be useful participants in the event of a prolonged emergency such as a long-term widespread loss of power. He admits it's an uphill battle.

"There's maybe 5 or 10 percent of the population that feels the need to get prepared… to help their neighbor," he estimates. To take advantage of that segment of the population he launched the Waldo Civil Defense Association[8], a 501c3 organization which supports the educational efforts of the Waldo Emergency Management Agency and conducts regular monthly training sessions in coordination with the county's adult education program, featuring all manner of preparedness topics.

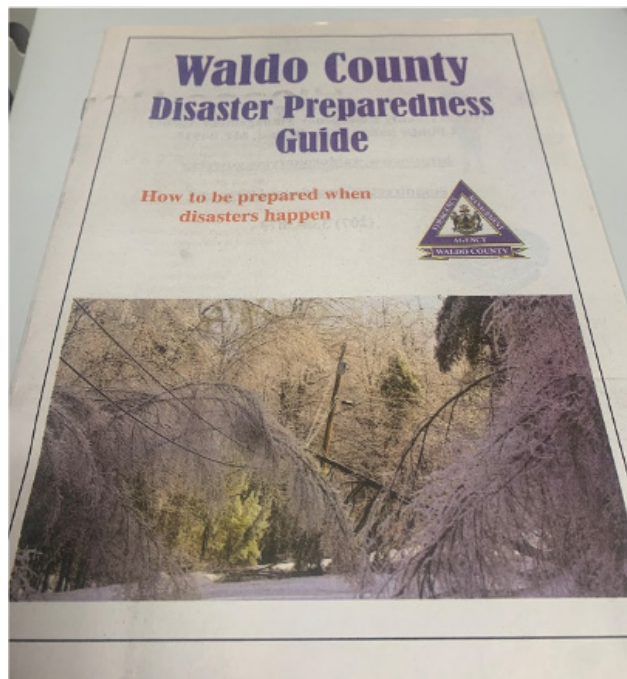But to really have an impact he knows he'll have to

Figure 8. One of the many preparedness manuals the Waldo County EMA distributes to citizens.

bring the various local town emergency managers on board, all of whom are volunteers with little or no staff or budget, which also means incorporating citizens.

"Don't think of [your citizens] as points of liability," Rowley tells town EMA directors, "Think of them as human resources." In February of 2023 Searsport, the county's second largest town, launched Waldo's first Community Emergency Response Team (CERT) at the town level.[9]

Together with the County, Town EMAs have participated in several tabletop exercises which have included scenarios related to long term power outages.

Part of the larger effort to incorporate citizens will involve the future formation of what Rowley calls Neighborhood Emergency Groups, based on a successful program in Washington state known as "Map Your Neighborhood."[10] The goal is to help communities come together as neighbors, identify their locally available resources, both material resources –ranging from water wells

to propane, and from chainsaws to FRS radios, to individual skillsets, including particularly medical professionals. Such a program would also help catalogue a neighborhood's needs and challenges – such as individuals with specialized medical needs– to better help prepare an emergency response.

One of the challenges to such an approach is a lack of willingness by emergency managers to lead by example. Rowley says he finds across the profession too many emergency managers who aren't willing to take their own advice and lack a mindset that encourages preparing for the worst, both at home and on the job. "I ask other emergency managers, are you prepared at home?" Far too many, Rowley says, simply aren't.

"I wouldn't consider myself a 'doomsday prepper,' but how are you going to preach to the masses about preparedness when you yourself do not do it?" He asks.

Having an Off-Grid Emergency Operations Center isn't sufficient if your emergency personnel aren't

Figure 9. Allowing the local amateur radio club to use the EOC as a meeting location helps to integrate volunteer radio operators into Waldo EMA's preparations.

prepared at home, leaving them unable or unwilling to leave their families in the event of an emergency.

Integrating Community Assets

Amateur Radio

Unsurprising considering their extensive radio communications set up, cooperation with the local county amateur radio club is an important part of the Waldo County EMA's community approach. Amateur radio has played a role in assisting during emergencies going all the way back to the 1930s. The American Radio Relay League (ARRL) operates the Amateur Radio Emergency Service (ARES), which is organized into local teams to cooperate with local and state emergency services and non-governmental organizations to help provide communications during emergencies. Through FEMA, the Radio Amateur Civil Emergency Service (RACES) creates a protocol for incorporating licensed and certified amateur radio volunteers into civil defense efforts. Additionally RACES certified operators are the only Amateur radio operators permitted to operate during an emergency declared under *The War Powers Act*.[11] While historically government regulations prohibited

amateur radio operators being paid to operate –even in support of emergency services– these regulations have been substantially relaxed. Through a State Homeland Security Grant Rowley has a full-time staff member at the Waldo County EMA who coordinates and assists in training the county's joint ARES/RACES team. Having a joint team gives Waldo County maximum flexibility to take advantage of both ARES and RACES protocols and powers. The team operates communications both at the op center and in the field from the Mobile Command Post. Rowley says that he finds amateur radio personnel a major force multiplier, since most emergency personnel are not trained radio operators. "Firemen fight fires, and they sometimes use a radio to do it. But having a team member who can focus just on communication helps free up emergency personnel to focus on what they do best," he explains.

Coordinating with Private Sector

In addition to integrating citizens into preparations for a prolonged emergency such as a long-term widespread power outage, it is also vital to establish firm cooperation with private sector businesses, especially those with responsibility for critical infrastructure.

Figure 10. As he advertises the concept of "Civil Defense" to the local community, Rowley truly "practices what he preaches" as the EMA director's vehicle was selected for minimal internal electronics to avoid radio interference for its extensive communications equipment.

As part of the Waldo County EMA's efforts to plan for a long-term power outage, Rowley put together a planning committee called the Emergency Fuel Supply Board (EFSB), which consists of representatives of the Sprague Searsport Fuel Terminal along with the local fuel transportation and retail gas stations. "Most people assume my top priority is the hospital, but hospitals have generators. My top priority is getting power to the fuel terminal so that in an emergency we can keep those generators running." The fuel terminal has significant power generation requirements, which include separate 200kW, 75kW and 25kW generators. While local management at the fuel terminal has been very cooperative, and at Rowley's recommendation successfully installed transfer switches to allow for the temporary deployment of rented generators in the event of a short-term power outage, securing a permanent back-up generation capability for the terminal remains on the Waldo County EMA's wish list.

Rowley is also working to encourage local fuel retailers to put generators on site, to ensure that fuel can be acquired from gas stations during a long-term power outage. In one case, the Waldo County EMA purchased a transfer switch and a generator to be available at a local gas station, in exchange for a memorandum of understanding regarding access to fuel for emergency management personnel during a disaster.

The Waldo County EMA has also met with all county food pantries to discuss plans for emergency food distribution and with local public health professionals to establish an Emergency Public Health Planning Committee to educate vendors, medical practices, and individuals about the importance of having plans those with electrical dependent medical devices.

The Waldo County EMA is also working with key leaders in the local community on a series of educational efforts to inform them of both manmade threats and natural hazards. Rowley has hosted educational briefings for these leaders on the threat posed by terrorists to the county's critical infrastructures and has also educated electric power industry leaders

about threats to the electrical grid, whether from electromagnetic hazards (natural or man-made) or from cyber or physical sabotage. These briefings for private sector and public sector partners not only improve threat awareness among the county's leaders but serve as an excellent networking opportunity for collaboration *before* an incident occurs that requires emergency management.

Conclusion

The Waldo County Emergency Management Agency stands out as a model for county emergency planners seeking to develop a "civil defense approach" to potential hazards, by mobilizing an educated and prepared population of citizens to respond to a "for the duration" emergency. The building of the county's new Off Grid Emergency Operations Center has led to expanded interest by both public and private sector entities in participating further in efforts to expand Waldo County's resilience in the event of a long-term widespread power outage or other major regional or nation-wide emergency event.

While Rowley admits that the funding mechanism which enabled him to build the EOC was something of a "unicorn," that is unlikely to be available every emergency manager, it shows that with proper planning, commitment, and a willingness to think outside the box, any county can increase its resilience in the event of long-term power outage. "We realize there's no 100% solution," Rowley stresses, "but by layering protections, adding 15% coverage here, another 25% there, we can improve our ability to withstand a long-term power outage."

Endnotes

1   All quotes by Dale Rowley from interview with the authors, July 10-11, 2023.

2   See: *Resilient Power Best Practices for Critical Facilities and Sites*, Cybersecurity and Infrastructure Security Agency, Department of Homeland Security, November 2022, available at: https://www.cisa.gov/sites/default/files/publications/CISA%20Resilient%20Power%20Best%20Practices%20for%20Critical%20Facilities%20and%20Sites.pdf

3   *Resilient Power Best Practices for Critical Facilities and Sites* pg. 77

4   *Resilient Power Best Practices for Critical Facilities and Sites* pg. 26

5   https://www.fema.gov/press-release/20230425/local-state-and-federal-partners-provide-food-assistance-during-covid-19

6   https://www.fema.gov/press-release/20230425/local-state-and-federal-partners-provide-food-assistance-during-covid-19

7   A "blacksky event" is a term used to describe, "a catastrophic event that severely disrupts the normal functioning of our critical infrastructures in multiple regions, for long durations," whether caused by a solar storm, electromagnet pulse attack, or other potential hazards. https://eiscouncil.org/black-sky/

8   https://waldocivildefense.org/

9   https://www.wabi.tv/2023/02/19/searsport-community-emergency-response-team-trains-aid-first-responders/

10   https://mil.wa.gov/map-your-neighborhood

11   https://www.usraces.org/

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