

**Additional Questions for the Record submitted by Dr. Paul N. Stockton<sup>1</sup>**

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**The Honorable Richard Husdon**

Q1. What risks to energy transmission and national security are posed when lawmakers pursue policy agendas that rush the electrification of various sectors, like transportation, industry, space heating, and agriculture? How much more serious, or dangerous, would blackouts be in a fully electrified world?

- A. Electrification poses a mix of potential benefits and serious risks to grid reliability and to national security. Electrification will not only reduce carbon emissions but also enable the adoption of new strategies to help keep the grid reliable when instabilities occur. The energy storage and demand-side management opportunities provided by electric vehicles (EVs) provide a case in point. EV batteries and fast charging infrastructure capable of two-way power flows may soon enable grid operators to conduct balancing and ramping operations in ways that are increasingly important. However, it is *absolutely vital* that such assets and operations be secured against cyberattacks, especially from China. Efforts are underway to defend EVs and other rapidly increasing types of loads. Yet, these efforts are in danger of falling behind adversary capabilities to manipulate loads and cause wide-area grid disruptions. I would be honored to further discuss these challenges if the Subcommittee desires. I address blackout issues related to electrification in my answer to Question 3.

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<sup>1</sup> Nothing in my testimony necessarily reflects the positions of the Department of Energy, the Department of Defense, or any other Federal agency.

Q2. How do you think North Carolina can better leverage innovative energy technology, like microgrids, in the face of grid failures? Could this improve the time it takes to get a substation back online?

A. Advanced microgrids can greatly strengthen the resilience of North Carolina’s military bases and other critical facilities against grid failures. For example, if State-wide blackouts occur, the ability of Fort Liberty (formerly Fort Bragg) to execute its mission critical functions associated with the 82nd Airborne and other combat assets is crucial for America’s security. We must assume that China’s leaders know this and may target the surrounding grid accordingly to disrupt base operations. The ability of Fort Liberty to segment from the grid, and function as a “power island” independent from grid-provided electricity, will be enormously important for countering such threats. The same is true of the value of advanced microgrids that can sustain the operations of military bases, water systems, hospitals, and other critical facilities across North Carolina. However, to bring substations back online (especially those that help comprise the Bulk Power System), grid-provided power will typically be necessary, provided either by importing power from outside the blacked out region or via the blackstart restoration operations I discuss in my answer to Q. 4.

Q3. There are many humanitarian and national security risks posed by rapidly electrifying sectors like transportation, industry, space heating, and agriculture. How have agencies built these risks into their emergency management strategies?

A. Every Federal, State, Local, Tribal, and Territorial emergency management agency must develop strategies to mitigate the dangers that wide-area blackouts would pose to public health and safety and national security. Electrification increases the importance of such strategies. To be effective, emergency management agencies must closely collaborate with the operators of critical facilities and electric utilities to pre-plan for the prioritized restoration of power. These partners must also exercise their emergency response plans – otherwise, they will offer little value.

Q4. What are the security gaps and challenges associated with delivering government aid and emergency services during a black out, as opposed to during some other hazard or disaster? What changes to local, state, and federal authorities should Congress make to better support your mission?

A. While almost all utilities and their emergency management partners are prepared for localized power outages, preparedness is much weaker for “Black Sky” events – that is, outages that simultaneously black out multiple regions of the United States. Under these circumstances, it would be very difficult (and perhaps impossible) for utilities to follow their traditional restoration strategies of importing power from surrounding, unaffected regions. Microgrids can help sustain critical operations in such an event. However, utilities must also be able to conduct blackstart restoration, and re-start the grid from within the blacked out area. The North American Electric Reliability Corporation (NERC) requires that every transmission operator have a plan to conduct blackstart restoration. These plans are almost never exercised under realistic conditions. Above all,

given the importance of blackstart to national security, we must assume that China will seek to disrupt blackstart operations, including by cutting off the flow of natural gas on which many blackstart generators depend. Helping the nation build preparedness for blackstart “under fire” should become a prime focus for Congressional action. I would be pleased to offer further data and recommendations on this topic if that would be helpful to the Subcommittee.