Secure the Grid Coalition

2020 Pennsylvania Avenue, N.W., Suite 189
Washington, D.C. 20006

Dear Secretary Granholm and distinguished members of the Secretary of Energy Advisory Board:

The *Secure the Grid Coalition* greatly appreciates the opportunity to voice recommendations to the SEAB for consideration during its July 26, 2022 in-person meeting at Argonne National Laboratory.

We would like to **build upon previous recommendations and requests made to SEAB** by our *Secure the Grid Coalition* on October 28, 2021, January 25, 2022, and April 19, 2022, (and the exhibits that were included in those submissions) with the following:

1) **Applauding SEAB's choice of Argonne National Laboratory as a meeting site**

2) **Applauding the appointment of Dr. Kathryn Huff as the Department of Energy Assistant Secretary for Nuclear Energy**

3) **Encouraging SEAB to make Nuclear Safety a Top Priority by following previous recommendations and investigating the 2003 Great Northeastern Blackout**

1) Applauding SEAB's choice of Argonne National Laboratory as a meeting site:

In light of our *Secure the Grid Coalition's* previous recommendations and requests, we are very pleased that SEAB is visiting in-person at the Argonne National Laboratory this week. Argonne has been the home of peaceful application of nuclear energy for 70+ years. Your visit creates a valuable opportunity for DOE to advance the inherent safety of Generation IV reactors, and especially the historical experimentation at Argonne's EBR II as the prototype of an Integral Fast Reactor, which was inserted into the live power grid at Idaho National Laboratory until EBR II was decommissioned in 1994. That, and Argonne's more recent work, can lead to the establishment of a workable means to achieve several additional goals concurrently. Those goals include the production of **inexpensive power through recycling spent nuclear fuel,** yielding many times the initial amount of electricity generation, while at the same time reducing both the volume of nuclear "waste" and the radiological toxicity of the spent fuel from hundreds-of-thousands of years to about one hundred years or less during the power generating process. Such a practical concept holds great promise to finally achieve the goal that was envisioned at the beginning of the peaceful use of nuclear technology, pioneered at Argonne, which was the provision of electricity that would be "too cheap to meter." In other words, a flat rate to each customer (like cellular phone service) for all the electrical power that residences, commerce, and industry could consume - undoubtedly a long term "quality of life" growth scenario for both the U.S. economy and American families nationwide.

2) Applauding Dr. Kathryn Huff as the DOE Assistant Secretary for Nuclear Energy

In light of our *Secure the Grid Coalition's* previous recommendations and requests, we are extremely happy to applaud the nomination by President Biden and the U.S. Senate confirmation of Dr. Kathryn Huff as the Department of Energy Assistant Secretary for Nuclear Energy. Dr. Huff is no stranger to Argonne, where she held a Fellowship while working on her doctoral dissertation.

We support Secretary Huff's statements made in response to questions posed during her U.S. Senate Confirmation Hearing.

At the opening of Secretary Huff's Senate Confirmation Hearing, Secretary Huff stated that, "I will prioritize activities to preserve the existing fleet of nuclear power plants, ***deploy advanced reactor technologies*** and ***sustainably manage spent nuclear fuel***, as well as work with our international partners to support technological transfer and American innovation" [emphasis added]. These words are supportively linked to certain requests and recommendations contained in written and verbal submissions by our *Secure the Grid Coalition* before previous meetings of the SEAB.

From January 25, 2022 SEAB meeting *Secure the Grid Coalition* written submission:

> *"(3) that the Department of Energy **adopt a new "Energy Earthshots" Initiative** that could be named the **"Carbon Free Millenia."** This concept involves the use of all-hazards secure advanced nuclear reactors and spent nuclear fuel **to provide up to 1000 years of clean power** and is further explained in Enclosure (A). We recommend you **work with willing state governments, such as New Hampshire**, which established a commission to study nuclear power and nuclear reactor technology, in part to explore this concept, as can be seen in Enclosure (C).*
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> *Enclosure (A) - STG-Coalition-Letter to DOE on Supply Chain RFI Jan 2022*
> *Enclosure (B) - Joe Weiss Comments on DOE RFI 1-13-22*
> *Enclosure (C) - NH Legislation Establishing Commission to Study Nuclear Power*

The Invasion of Ukraine and Nuclear Feedstock Supply Chain:

Russia's invasion of Ukraine brings to the forefront the matter of domestically produced nuclear fuel feedstocks. According to Senator Joe Manchin, Chairman of the U.S. Senate Committee on Energy and Natural Resources, Russian state-owned ***Rosatom*** represents approximately 41% of global conversion capacity and 52% of global enrichment capacity.

Therefore, any advanced nuclear ambitions of the United States is dependent upon Russia and its allies Kazakhstan and Pakistan to meet almost 50% of the required "High-Assay, Low Enriched Uranium" (HALEU) to fuel these advanced nuclear designs. The states of Wyoming and Washington are hosting inroads into advanced designs, and we believe every effort should be made to support them.

We therefore applaud Assistant Secretary Huff offering solutions to this now even more menacing problem during her U.S. Senate confirmation hearing, stating that "we need to build out capacity for a Western alternative to the Russian component of the uranium market, including conversion and enrichment capacity."

3) Encouraging SEAB to make Nuclear Safety a Top Priority by following previous recommendations and investigating the 2003 Great Northeast Blackout

The U.S. Nuclear Power Complex has a safety record that is unparalleled among all other industries. The dangers lie not in the safeguards of the nuclear complex, but rather in the transmission and distribution grids that supply offsite power to keep reactors and fuels at properly safe temperatures to avoid catastrophic outcomes.

Therefore, we encourage the SEAB to prioritize nuclear safety by (1) supporting whistleblower protections for employees of the wider electric grid, by (2) deeply investigating the resilience and reliability of Emergency Diesel Generators (EDGs) associated with nuclear power safety systems by (3) analyzing real-world evidence that these systems may be targeted by adversaries and terrorists, and by (4) investigating the 2003 blackout.

(1) <u>Supporting whistleblower protections for employees of the wider electric grid:</u>

From the October 28, 2021 SEAB meeting *Secure the Grid Coalition* written submission:

> *Because of the horrific consequences attendant in faulty operation or unheeded proper practices in the nuclear energy segment,* ***nuclear energy workers have protections*** *that have not been afforded to others in the Energy Complex writ large. However, this ignores the universally known fact that safe operation of nuclear power plants depends upon offsite power delivery to for safety systems that support the reactors and cool spent fuel cooling.2* ***Grid operators involved in providing offsite power delivery to nuclear plants do not have whistleblower protections.***
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> *1 https://www.whistleblowers.gov/statutes*
> *2 It is true that on-site backup generators, Emergency Diesel Generators (EDG), are capable, but they are not sufficiently dependable to bear the potential risks involved.* ***Enclosure (D)*** *are comments filed by our Coalition to the Federal Energy Regulatory Commission (FERC) that outline our concerns about risks to nuclear station offsite power, particularly as it pertains to the prospect that offsite substations could be using foreign-manufactured equipment such as any of the 372 large electric power transformers from the People's Republic of China (PRC).*
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> *Enclosure (D) - Abbreviated STG Coalition Motion to Intervene on FERC Docket EL21-99-000*

(2) <u>Deeply investigating the resilience and reliability of Emergency Diesel Generators:</u>

Also from October 28, 2021, SEAB meeting *Secure the Grid Coalition* written submission:

> ***INFORMATION RESOURCES JUSTIFYING THE CONCERN WITH (EDGs)***
> *The Secure the Grid Coalition would like to provide the Commission and its staff with information resources that justify the concerns of Dr. Lim and our Coalition and point to the need for a FERC-led Technical Conference and Task Force to lead an investigation into the matter of Chinese-made transformers and grid components, particularly those which could cause a loss of offsite power to nuclear power stations. These are listed, chronologically, in the attached enclosures listed below:*
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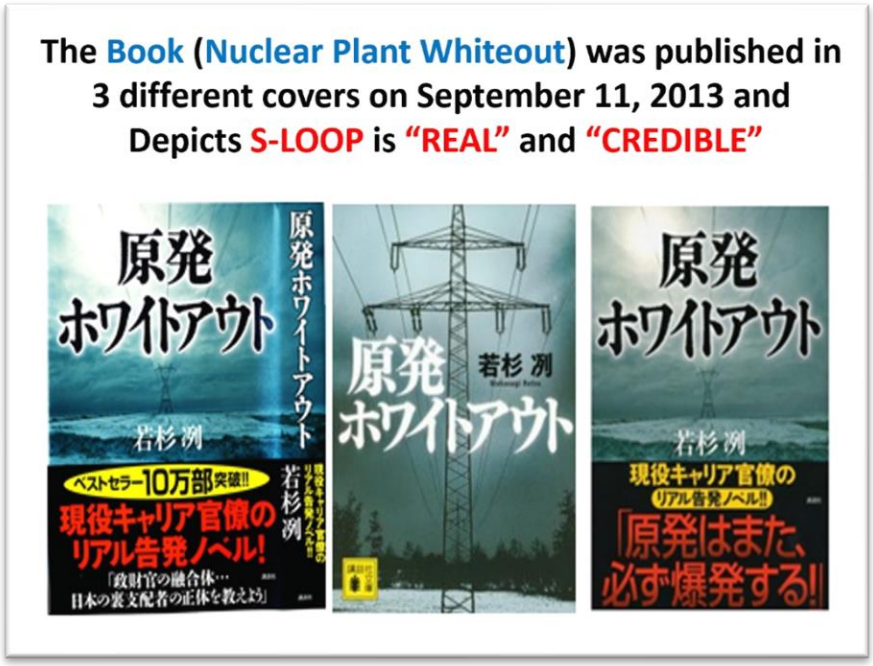
> - *Enclosure 1 - Method of Attacking Nuclear Power Stations Remotely By Dr. Gene Lim – Sept 2021*
> - *Enclosure 2 - "Futility At The Utility" by Union of Concerned Scientists – Feb 2007*
> - *Enclosure 3 - "NRC Information Notice 2008-05: Fires Involving Emergency Diesel Generator Exhaust Manifolds" – Apr 2008*
> - *Enclosure 4 - "NRC Information Notice 2010-04: Diesel Generator Voltage Regulation System Component Due To Latent Manufacturing Defect – Feb 2010"*
> - *Enclosure 5 - "NRC Information Notice 2010-23: Malfunctions Of Emergency Diesel Generator Speed Switch Circuits – Nov 2010"*

- *Enclosure 6 - ISL "Emergency Diesel Generator Failure Review 1999 – 2001" – Sept 2011*
- *Enclosure 7 - "Nuclear Power(less) Plants" by Dave Lochbaum – Oct 2015*
- *Enclosure 8 - "USAF Electromagnetic Defense Task Force Report 2.0" – 2019 – See Appendix 1, pages See appendix 1 and 1.1 – pages 53 through 73*
- *Enclosure 9 - "NREL Report on Emergency Diesel Generator Reliability and Installation Energy Security – April 2020"*

(3) <u>Analyzing real-world evidence that these systems may be targeted by adversaries and terrorists</u>:

Dr. M. Gene Lim prepared a series of PowerPoint slides for the **October 28, 2021 *Secure the Grid Coalition* written submission to SEAB.** These slides present the dangers of relying solely on Emergency Diesel Generators during loss of offsite power, and to highlight the necessity of protecting sources of offsite power to nuclear power plants. These slides provide an overview of how an adversary can attack nuclear power stations remotely by attacking the sources of offsite power, and provide evidence that adversaries are familiar with these attack techniques.

Dr. Lim previously provided accounts of the Japanese book, **<u>Nuclear Plant Whiteout</u>.**



As of today, some of the pages of this book have been translated into English, and these tell the fictionalized account of how a Communist terrorist operative attacks the offsite power to a nuclear generating station by detonating small explosive devices at pylons supporting transmission / distribution network conductors during a severe blizzard weather condition.

From the book: *"No, as long as you have physical strength, it is actually easy for even a Japanese amateur to defeat a power transmission tower."*

To quickly paraphrase the story:

The crisis of loss of offsite power jeopardizes the nuclear power plant and is immediately turned more critical because seasonally low temperatures have caused the diesel fuel to "gel," clog the fuel filters, and render the diesel generator useless in providing safe operating temperatures for the reactor to keep pressures from rapidly rising. External power supplies are summoned, which are warehoused some distance from the reactor and the nuclear plant site. Vehicular transportation to retrieve the stored power supplies are defeated by blizzard and deep snow and the temperature and pressure inside the reactor rises…

This text, while a work of fiction, accurately depicts the folly of holding to the notion, as many do, that loss of both offsite power together with the loss of Emergency Diesel Generator functioning is an unthinkably remote possibility.

(4) Proposed Investigation of the 2003 Great Northeastern Blackout

To reality-check the possibility of loss of offsite power coupled with crippled automated ignition of diesel backup generation, SEAB should investigate the 2003 Great Northeastern Blackout which caused these eight nuclear power generating stations to shut down:

- Fermi 2 – Newport, Michigan
- Oyster Creek – Forked River, New Jersey (decommissioned September, 2018)
- Nine Mile 1 – Scriba, New York
- Fitzpatrick – Scriba, New York
- Nine Mile 2 – Scriba, New York
- Ginna – Ontario, New York
- Indian Point 2 – Buchanan, New York (permanently shutdown April, 2020)
- Indian Point 3 – Buchanan, New York (permanently shutdown April 2020)

The *Secure the Grid Coalition* recommends that the relevant logs stored on the site's central computer at each of the above nuclear plants be investigated to determine if any, and how many, of the automated ignition systems of Emergency Diesel Generators failed to make the 11-second response, and how many of these generators required manual starting, even as temperatures and pressures were rising in the reactor.

We believe such an investigation will reinforce comments we made to SEAB on April 19, 2022, where we recommended the following to help Nuclear Power Plants react to a Loss of Offsite Power:

> ***(1) High Reliability Unattended Backup Power technologies:*** *The Foundation for Resilient Societies' 11-year-old recommendations [within PRM-50-96] for High Reliability Unattended Backup Power included three technologies which are commercially available today: Organic Rankine Cycle power production, Solar Photovoltaic power production, and Thermoelectric Generator power production. More recently, small modular reactors (SMRs) have gained prominence for all-hazards resilient, walk-away-safe power producers. While SMRs installed at existing nuclear sites for augmented power production would be ideal as a source of back-up power for safety systems, any and all currently available technologies must be immediately assessed and incorporated to augment/replace the current emergency diesel generators that provide back-up power to safety systems that keep spent fuel cool.*
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> ***(2) Real-time surveillance and monitoring systems:*** *If, in the wake of the Fukushima accident, nuclear power plant licensees do not already employ physical surveillance systems, radiation monitors, and pool temperature monitors for infrastructures storing and cooling spent nuclear fuel, these should be immediately installed. Monitoring data should be made available in real time to:*
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> > *a. The Strategic Alliance for FLEX Emergency Response (SAFER) centers located in Memphis, Tennessee and Phoenix, Arizona. These SAFER centers are the nuclear-industry-led national response centers that help meet the requirements of the NRC's Mitigation Strategies Order, issued after the Fukushima accident. They provide "Diverse and Flexible Mitigation Capability" (FLEX) portable equipment to help provide cooling to nuclear plants experiencing an emergency such as what took place during the Fukushima accident.*

b. State-level fusion centers where nuclear power plant licensees reside. State-level emergency response assets (National Guard, State Guard, State Police, Fire crews, etc.) should be informed on what must be done to maintain spent fuel cooling and refuel existing emergency diesel generators until the above "High Reliability Unattended Backup Power technologies" are adequately installed at spent nuclear fuel storage pool sites.

Willingness to Assist

As always, our Secure the Grid Coalition is ready to assist the SEAB and can make personal introductions to numerous experts throughout the country who can help DOE act on the above recommendations.

Respectfully submitted by,

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