MARIA KORSNICK
President and Chief Executive Officer

1201 F Street NW, Suite 1100
Washington, DC 20004
P: 202.739.8187
mgk@nei.org
nei.org

NUCLEAR ENERGY INSTITUTE

July 23, 2020

The Honorable Dan Brouillette
Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Updated Need for High-Assay Low Enriched Uranium

Dear Secretary Brouillette:

The Nuclear Energy Institute appreciates the Department of Energy's (DOE) leadership and commitment to helping preserve and strengthen the civil nuclear energy sector. The Department's support for the development of innovative technologies, including the next generation of advanced reactors, and advanced fuels for the existing fleet of reactors, will help ensure that nuclear power continues to bolster America's national security by providing the dominant source of resilient, carbon-free power in the United States. In particular, the industry appreciates the steps the Department has taken this year with the release of the Advanced Reactor Demonstration Program Funding Opportunity Announcement and the release of the report, *Restoring America's Competitive Nuclear Energy Advantage*.

The existing fleet of reactors in the United States runs on uranium fuel that is enriched up to 5% Uranium-235. Many advanced reactor designs and at least one advanced fuel design for the existing fleet require High-Assay Low Enriched Uranium (HALEU). Unfortunately, the current commercial nuclear fuel suppliers, with the possible exception of Russia, are unable to produce uranium enriched between 10 and 20%.

The U.S. industry is very concerned that a sufficient domestic commercial supply of enriched uranium between 10 and 20% will not be available in time to support the development, demonstration, and deployment plans for advanced reactors. We appreciate the investment that Congress and the Department of Energy have made in demonstrating U.S. enrichment technology for producing unobligated HALEU. However, the resulting pilot facility will be

capable of only producing less than a metric ton of HALEU per year, which is well below the requirements of the industry as discussed below. Without an assured supply of HALEU, the commercialization of many advanced nuclear technologies is in jeopardy. At the same time, the necessary commercial investment into a domestic HALEU fuel infrastructure is highly unlikely given the market uncertainty. To help bridge the gap in supply, NEI, on behalf of the industry, requests that DOE establish an interim supply of HALEU and thereby accelerate the development of both HALEU fuel infrastructure, advanced reactors, and advanced fuels. The DOE currently has material that could be used to provide an interim supply. DOE possesses an inventory of high-enriched uranium that could be downblended to HALEU, and DOE also manages spent high-enriched fuel that could be processed and converted into HALEU. We appreciate the ongoing processing of spent EBR-II fuel, which is producing a limited amount of HALEU for use on Idaho National Laboratory's site. Due to residual contaminants, the processing of spent high-enriched fuel may not be acceptable for all advanced reactor designs. In addition, the DOE could further spur the development of a HALEU infrastructure through multi-year purchase agreements of HALEU from commercial enrichers.

NEI has surveyed advanced reactor developers and fuel designers that plan to utilize HALEU to identify their annual needs to 2035. The attached table provides this data. This is an update to the needs assessment that was provided to Secretary Perry on July 5, 2018. The names of the companies and the specific reactor designs have been withheld. This table does not necessarily represent the needs of all developers utilizing HALEU, and it does not include the uranium needs for those companies and utilities that will utilize uranium enriched between 5% and 10%. The developers represented in the table cover a range of advanced reactor technologies and a range of reactor sizes from a few Megawatt-electric to hundreds of Megawatt-electric and includes deployments in the U.S. and Canada. Although the reported data is based on each developer's projection, the diversity of designs, applications, and markets provides confidence that there is minimal overlap in the developer's potential customer base. Although the annual HALEU needs may seem rather large by 2035, it is only a small amount as compared to the approximately 2,000 metric tons of uranium used annually by the existing fleet in the United States. As a result, it is challenging to establish a domestic commercial supply of HALEU in the near term. However, without a HALEU supply chain or fuel supply certainty, many advanced reactor designs and advanced fuels will simply not be commercialized.

Establishment of an interim HALEU supply by DOE is consistent with the report, *Restoring America's Competitive Nuclear Energy Advantage*, which states that:

> *The Strategy to Restore American Nuclear Leadership is designed to right the ship and restore America's comparative nuclear advantages. It will de-risk the fuel cycle, assure national security, and restore America's international leadership in technology and nonproliferation standards, revitalizing the U.S. nuclear industry to compete effectively in the global nuclear market.*

The federal government is in a key position to de-risk and accelerate the development of this infrastructure by providing an interim supply of HALEU fuel and supporting the development of future facilities.

NEI appreciates the Department's attention to this urgent issue and we will continue to work with the Department to ensure that the advanced reactor developers and advanced fuel designers have the fuel that they need when they need it. Please feel free to contact me or Everett Redmond (elr@nei.org; 202-361-1876) if you need additional information.

Yours sincerely,

Maria Korsnick

Maria Korsnick

Attachment

c: The Hon. Mark Menezes, U.S. Department of Energy
The Hon. Rita Baranwal, U.S. Department of Energy
Andrew Griffith, U.S. Department of Energy
Alice Caponiti, U.S. Department of Energy
Ben Reinke, U.S. Department of Energy
Daniel Vega, U.S. Department of Energy

Attachment

Estimated Annual Requirements for High Assay Low Enriched Uranium to 2035 (MTU/yr)

Company	A	B	C	D	E	F	G	H	I	J	K	Total	Cumulative
Enrichment Range	13-19.75%	19.75%	10-19.75%	15.5%	19.75%	19.75%	19.75%	10.9-15.5%	14.4%	12-13%	19.75%		
Year													
2021		1.7								1.1	0.0	2.8	2.8
2022		3.3								0.0	0.0	3.3	6.1
2023	1.0	3.3					1.0			4.4	0.0	9.7	15.8
2024	1.0	3.3	0.2						0.5	6.6	0.4	12.0	27.8
2025	1.0	3.3	0.2		15.0		1.0		0.5	11.0	0.0	32.0	59.8
2026	1.0	3.3	0.2	3.1	15.0		3.0	24.2	0.5	13.2	0.7	64.2	124.0
2027	1.0	3.3	1.6	4.0	5.0		3.0		0.5	13.2	1.1	32.7	156.6
2028	1.0	3.3	1.6	4.8		17.5	6.0		0.5	13.2	2.1	50.0	206.6
2029	1.0	5.0	1.6	5.7	17.0		6.0	24.2	0.5	16.5	4.2	81.7	288.3
2030	23.0	5.0	3.0	7.8	46.0	19.0	9.0		1.0	16.5	7.0	137.3	425.6
2031	35.0	6.7	4.5	11.5	29.0	20.5	9.0	24.2	3.0	16.5	10.5	170.4	596.0
2032	47.0	6.7	6.0	15.9	46.0	22.0	12.0	24.2	6.0	19.8	14.4	220.0	816.0
2033	58.0	8.3	9.0	21.0	46.0	23.5	12.0	48.4	9.0	19.8	19.3	274.3	1090.2
2034	70.0	8.3	15.0	26.8	46.0	25.0	12.0	121	12.0	19.8	25.2	381.1	1471.3
2035	93.0	10.0	21.0	35.8	91.0	26.5	12.0	145.2	15.0	22.0	29.8	501.3	1972.6

Notes:

- The material needs listed above are in metric tons of uranium per year and are a small amount compared to the approximately 2000 MTU used annually by the existing fleet of reactors.
- The year the material is needed is for fuel fabrication. Insertion in the reactor and reactor operations will occur in a later year.
- The material needs that are less than 1 MTU/year are for irradiation samples, lead test rods and lead test fuel assemblies.
- The material needs represent a few scenarios
    - The deployment of an advanced fuel design for the existing fleet of light-water reactors.
    - The deployment of multiple reactors of the same design that will not require refueling for many years.
    - The deployment of reactors that have annual refueling requirements.
- These reactors include a range of sizes from a few Megawatt electric to 100s of Megawatt electric.
- The data above does not include utilities that are considering enrichment between 5% and 10%.