CLEARPATH

Accelerating conservative clean energy solutions

Advanced Reactors Lack Source of Special Fuel

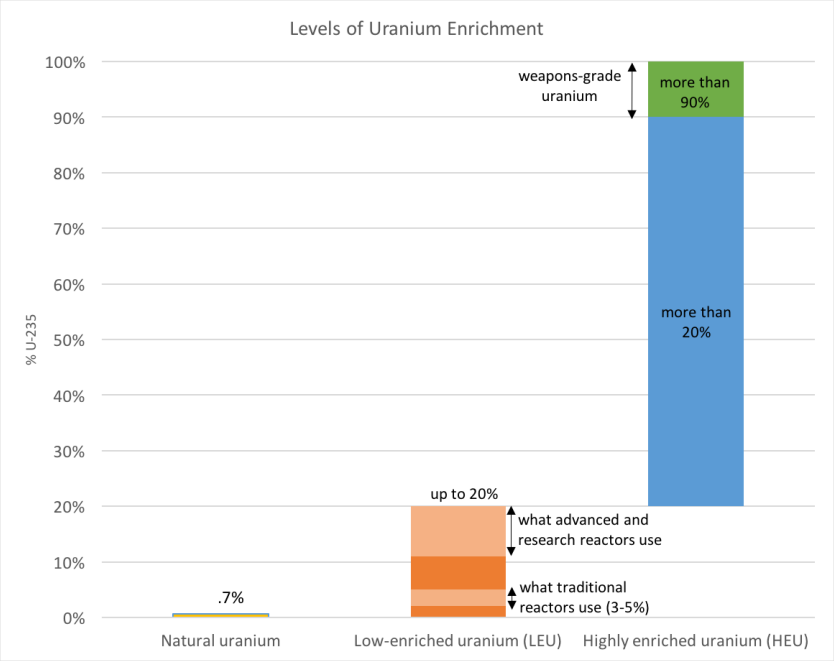
July 1, 2016

Advanced nuclear reactors have the potential to revolutionize our energy system. In order to prove these technologies, our scientists need access to a type of fuel (called 19.75% LEU) that's not available on the market today. The Department of Energy is considering producing the fuel within one of its existing programs, but it's currently directed to make a common fuel that is already oversupplied and can only be used by conventional reactors.

What are advanced nuclear reactors?

Virtually every nuclear power plant in operation today is based on one reactor type developed over 60 years ago. The next generation of advanced reactors, often referred to as Generation IV, are fundamentally different and can be tailored to meet the world's changing energy needs. All advanced nuclear designs incorporate passive safety mechanisms, and many designs can even use recycled nuclear waste as fuel. Others are small enough to be mass-produced in factories, significantly slashing construction costs and saving time. You can learn more about advanced reactors here.

What's different about the fuel?



Naturally occurring uranium harvested from mines only has a concentration of 0.7% U-235 isotope. However, this concentration is not high enough for nuclear reactions to occur. Nuclear reactors require "enriched" uranium, meaning the U-235 needs to be further concentrated. Uranium is enriched to different levels, depending on its end-use.

Today's current nuclear power plants use uranium enriched to about 5%. In contrast, advanced reactors are often designed to use up to 20% U-235. Higher enrichment for advanced reactors will also allow longer runtimes (5-10 years of continuous operation) and create less nuclear waste.

Any uranium lower than 20% is "low enriched uranium", or LEU. Anything above 20% enrichment is known as "highly enriched uranium", or HEU, and is subject to a different set of regulations. For example, nuclear weapons require enrichment of 90% or higher.

1355 Greenwood Cliff Suite 301 • Charlotte, NC 28204
611 Maryland Ave NE • Washington 20002

Why is this an issue?

Of the 48 companies currently developing advanced nuclear technology in North America, over half of them will likely need access to 19.75% LEU for testing or demonstration facilities. Many of these companies are gearing up to begin testing, but there is currently no commercial supply of 19.75% LEU available in the US. No domestic supplies are anticipated until the company Urenco expands their nuclear enrichment facility in New Mexico in 2023. Any delay in access to 19.75% LEU will only further delay the development of this essential technology, and will likely drive our entrepreneurs overseas to Russia or China where 19.75% LEU exists.

What's the solution?

One alternative to enriching natural uranium up to 19.75% is to dilute highly enriched uranium down. In fact, the Department of Energy (DOE) and the National Nuclear Security Agency (NNSA) already have a program that creates 5% LEU for commercial nuclear reactors from excess HEU leftover from military activities. This program, known as "downblending", is worthwhile as we seek to limit proliferation of Highly Enriched Uranium, but there is no reason it must be downblended all the way to 5%. The DOE and NNSA could use their downblending program to ensure that American nuclear developers have access to a domestic supply of 19.75% LEU.

This is an apt time to switch some of our downblending activities to 19.75%. There is a global oversupply of 5% enriched uranium, and the DOE's introduction of downblended uranium has had market distorting effects in the past.

What's the next step?

The DOE has issued a contract for the company Nuclear Fuel Services to begin downblending 10.2 metric tons of HEU to 5% LEU at their Erwin Tennessee facility as soon as this month. If entirely downblended, this shipment of HEU would produce 50 metric tons of 19.75% LEU, enough to test several advanced reactors. This contract should be renegotiated to downblend to 19.75% instead of 5%, with the resulting product stored safely by the National Nuclear Security Agency for future use by nuclear companies. This move would maintain America's leadership role on nuclear technology and keep our entrepreneurs from deploying their technologies abroad.