

# The Big 6 Uranium Questions Answered

Apparently it's comforting to have a nice stash of uranium in your back pocket. At least that's what the US Government seems to be saying in their budget for the 2021 fiscal year.

The recently released budget directs a notable chunk of funding to build U.S. uranium reserves. In fact, the budget item highlights US\$150 million per year over a 10-year period. This eye-catching US\$1.5 billion plan gets a good analysis in the [InvestorIntel article](#) published on February 11th, 2020.

With the sudden renewed interest in uranium, investors are looking to get comfortable with it too. More than most other elements in the earth's crust, uranium has a PR problem. Nuclear bombs and power plant meltdowns have a way of mentally blocking out uranium's value in supplying dependable power to nations. **But with US\$1.5 billion looking for a place to land, investors will want to brush up on their uranium knowledge in order to recognize the opportunities ahead.**

In a series of articles, we are going to address some of the most commonly asked questions about this misunderstood element. And why not start with the "why" questions?

## **#1. Why does the US want a uranium reserve?**

The budget signals clearly that the US government is looking to support the domestic uranium production industry. According to the World Nuclear Organization, in 2017 the USA held just 1% of the known uranium resources in the world. Topping the list is Australia with 30% and Canada with 8% of the known resources.

Also consider that many of the resources on US soil are owned by foreign companies, the control yielded by the previous administration. **US President Trump states that the development of the uranium sector is an issue of national security.** A lack of supply could easily lead to future energy shortages and brownouts. Simply put, Trump does not want another country's finger on America's light switch.

## **#2. Why is uranium used?**

Uranium's primary use is in nuclear power plants to generate electricity. In the US, nuclear power accounts for about 20% of all electric energy generation. For comparison uranium as a fuel contains as much as 20,000 times the energy value as an equivalent mass of coal.

Using uranium in this way is sometimes compared to boiling water in the most complicated way possible. Uranium is a radioactive element, and in certain states, it undergoes a controlled nuclear reaction in the power plant to produce heat. This heat transfers to water surrounding the nuclear fuel. The water then boils and produces steam that drives a turbine and finally an electric generator. The process is well-established and has generated power for the past sixty years.

## **#3. Why is uranium non-renewable?**

Surprisingly the earth does renew its uranium. But the process is much slower than our current rate of usage. Uranium is an element easily found at an average abundance of 1.4 parts per million (ppm) in the earth's continental crust. That said, uranium needs to be mined from naturally occurring deposits at much higher concentrations for it to be economic. In Canada, the first mines in Elliot Lake, Ontario averaged around 1 kg per tonne or 1000 ppm. The mined deposits in Saskatchewan grade up to 140 kg per tonne or 140,000 ppm.

In nuclear reactors, uranium gets worn out in the power generation process. The spent uranium can become other radioactive products and can be used in other industries. A well-known by-product is radioisotopes used in medicine for tracing and treatments. While not actually recyclable, uranium fuel is reused. Spent nuclear fuel bundles are reprocessed to recover usable materials to create fresh fuel for nuclear plants. This process may recover 20 to 30% of the energy value still in the fuel.

It is a fascinating fact that the earth also recycles uranium through the process of plate tectonics. Uranium decay is the main driver of convection currents in the mantle pushing the plates along and returning uranium to the continental crust through volcanic activity.

#### **#4. Why is uranium expensive?**

Actually uranium is not expensive. The current price of uranium on world spot markets is US\$ 24.60 per pound (of U3O8) and is down 1.2% in 2020. The market is in a long-term price downtrend supported by secondary supplies likely to impact the market until 2024. Then base demand for the fuel is expected to grow by 8% through 2035.

Instead, the real cost in using uranium is the cost of building the power plants. This is due to the significant construction costs associated with safety, security and containment of the nuclear reactor. The cost of uranium as part of the nuclear fuel is less than 50% of the total and includes conversion, enrichment and the fabrication of fuel pellets. The initial fuel charge of a nuclear plant is generally only 3% of the capital cost.

More recently, the industry is looking to reduce its capital requirement by the development of small modular reactors (SMR). This technology consists of modular reactors built in factories and then installed in power plant structures and

remote locations. This smaller and simplified design should result in lower capital costs.

## **#5. Why is uranium dangerous?**

Most of the fear of uranium concerns two areas: nuclear fuel used for atomic bombs, and nuclear plant meltdowns releasing radioactive particles. Historically two atomic bombs were detonated with intentional loss of human life. There were also two large nuclear power plant failures: in Chernobyl and in Fukushima. The 1986 Chernobyl failure in Ukraine led to 30 direct fatalities and up to 4,000 thyroid cancer cases in those who were children when exposed. The Fukushima failure did not cause any immediate health effects. However, in both cases large areas of the country are under controlled access due to nuclear contamination.

Undoubtedly these are tragic events, and yet also rare. All nuclear plants are regulated with strong technical, security and safety oversight. Only in the fictional TV show *The Simpsons* do you see an incompetent Homer Simpson behind the controls. All forms of electrical power generation produce some form of waste. The nuclear power industry is the only one that is fully responsible for managing all of its waste.

## **#6 Why is uranium green?**

Again, only in *The Simpsons* does a nuclear fuel rod glow “green,” and they are never handled this carelessly. But does it create “green energy?” Uranium used for nuclear power can be considered a green energy source by merit of its lower greenhouse gas output. The nuclear power reactor itself does not emit greenhouse gases because no carbon fuels are burned. But, nuclear power plants do emit greenhouse gases if they use cooling towers that emit water vapour—the largest and most significant greenhouse gas.

As investors, we want to buy what we understand. **Understanding**

**uranium rationally means recognizing it as a cost-effective and important part of supplying our world with energy. It continues to play a role in reducing noxious pollutants associated with the burning of coal or other fossil fuels for electricity.**