



UPA

DOE REQUEST FOR
INFORMATION
RESPONSE

2016

N O T I C E

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INTRODUCTION

The following analysis is provided by TradeTech, LLC at the request of the Uranium Producers of America (UPA) at it relates to the US Department of Energy (DOE) Office of Nuclear Energy's Request for Information (RFI) on July 15, 2016. DOE has requested comments and information as it prepares for the potential issue of a new Secretarial Determination¹ covering transfers of uranium for cleanup services at the Portsmouth Gaseous Diffusion Plant in Ohio and for downblending of highly enriched uranium (HEU) to low-enriched uranium (LEU) to support national security objectives.

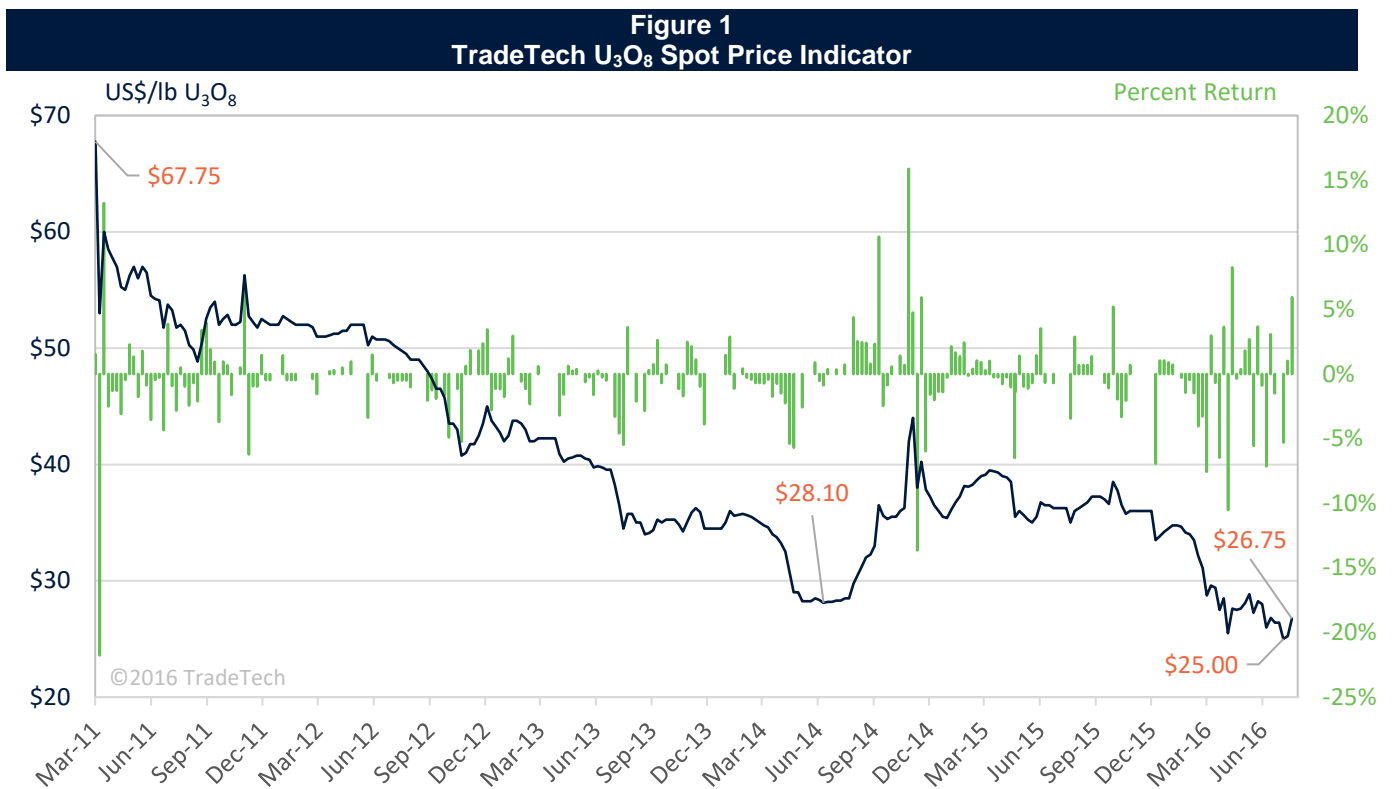
The RFI solicits information from the public about the uranium markets and US uranium industries, and the potential effect(s) of DOE transfers into the uranium markets and possible consequence(s) for the US nuclear fuel cycle industries, including uranium mining, conversion, and enrichment businesses. The information received by DOE will partially inform its analysis to determine whether its transfers would have an "adverse material impact" on the US uranium mining, conversion, or enrichment industries.

¹ The most recent Secretarial Determination was issued by US Secretary of Energy Ernest Moniz on May 1, 2015, and like previous determinations, determined that continued uranium transfers for cleanup services at the Portsmouth Gaseous Diffusion Plant and for downblending of highly enriched uranium to low-enriched uranium will not have an adverse material impact on the domestic uranium mining, conversion, or enrichment industries ("2015 Secretarial Determination"). However, the latest Secretarial Determination supports lower rates of uranium transfers in the near term; it supersedes the previous determination issued in May 2014, which covered transfers for these two programs of up to the equivalent of 2,705 MTU (~7 million pounds U₃O₈) per year. Previous DOE policy statements indicated that the introduction into the US market of uranium from Departmental inventories in amounts that do not exceed 10 percent of domestic demand in any one-year period should not have an adverse material impact on the domestic uranium industry.

ADVERSE MATERIAL IMPACT

Suppliers in today's uranium market face significant challenges, including oversupply, discretionary demand, reduced contractual coverage among buyers, and a heightened risk profile in the capital markets.

Fundamentally, persistent oversupply in the post-Fukushima period (post-March 2011) has led to periods of low liquidity and low volatility, which have manifested as downward price pressure as shown in **Figure 1**. The uranium spot price, perhaps the most salient indicator of the uranium market's current state, has declined more than 60 percent since the Fukushima accident in 2011. The average weekly return on the uranium spot price since March 11, 2011 has been -0.28 percent and, has declined 60.5 percent over that period. The July 15, 2016 price of US\$25.00 per pound U₃O₈ was the lowest in over 11 years.



Historically low uranium prices have resulted in deferred production and industry contraction and consolidation. Recently, in the USA:

- US domestic uranium concentrate production declined 32 percent between 2014 and 2015;
- Cameco announced plans to curtail its US production; and
- US uranium producer realized prices fell for the third year in a row, declining 26 percent overall since 2012.
- Total US uranium production fell to 1.4 million pounds in the first half of 2016, a 29 percent decrease compared to the same period in 2015, according to the US Energy Information Administration (EIA); *Uranium Production Report 2nd Quarter 2016*.

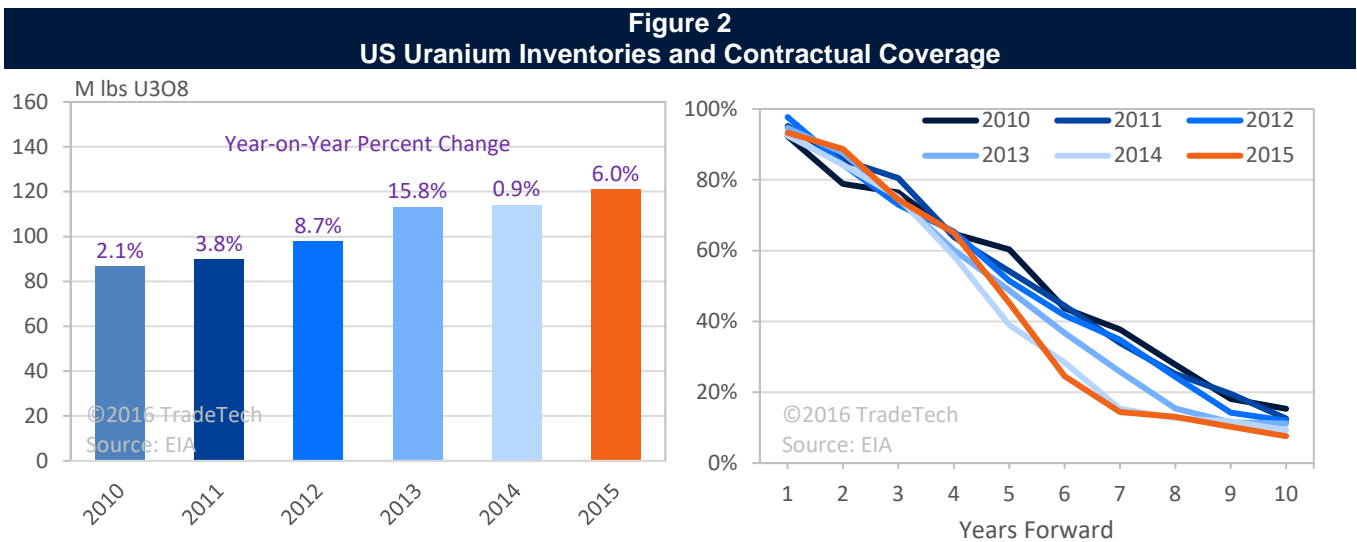
On the demand side, four additional reactors in the USA have been identified for early decommissioning, bringing the total number of premature US reactor unit shutdowns to 12. Forecasts indicate decreased uranium requirements in the long term for Japan, stagnant US requirements, and decreased requirements in select European nations. Emerging Chinese uranium demand is not necessarily driven by reactor requirements, but is seemingly strategic in nature and, therefore, presents a downside demand risk to the market should its current rate of procurement suddenly decrease.

US Uranium Market Trends

According to the EIA, in 2015 owners and operators of US civilian nuclear power reactors took delivery of 57.0 million pounds U₃O₈e (including 54.5 million pounds U₃O₈e in spot and term contracts) from US and foreign suppliers last year. In 2015, 21 percent of U₃O₈e was purchased under spot contracts at a weighted average price of \$36.80 per pound. While utility purchases rose marginally from 53.0 million pounds purchased a year earlier, the weighted-average price for purchases fell nine percent to \$43.86 compared with the 2014 price of \$48.11.

EIA data show that, in 2015, owners and operators of US civilian nuclear power reactors held 121 million pounds U₃O₈, 40 percent higher than the 2010 total of 86.5 million pounds U₃O₈ (**Figure 2**). Inventories are comprised of material at various stages of the front end of the fuel cycle and, within the USA, equate to over two and one-half years' worth of fuel coverage for a given US utility's estimated 2016 requirements. In comparison, utilities in the European Union (EU) held approximately 134.9 million pounds U₃O₈ (or three years' gross requirements) at the end of 2015, 14 percent higher than the 117.9 million pounds U₃O₈ held in inventory in 2010, according to Euratom Supply Agency data.

Consonant to this increase, a decrease in contractual coverage has materialized. In 2015, US aggregate contractual coverage equated to a coverage rate of 93 percent in 2016 for natural uranium, declining to 45 percent in 2020, then to just 8 percent by 2025. In 2010, those rates of coverage were 92, 60, and 15 percent for equivalent years forward.



Impact on margins

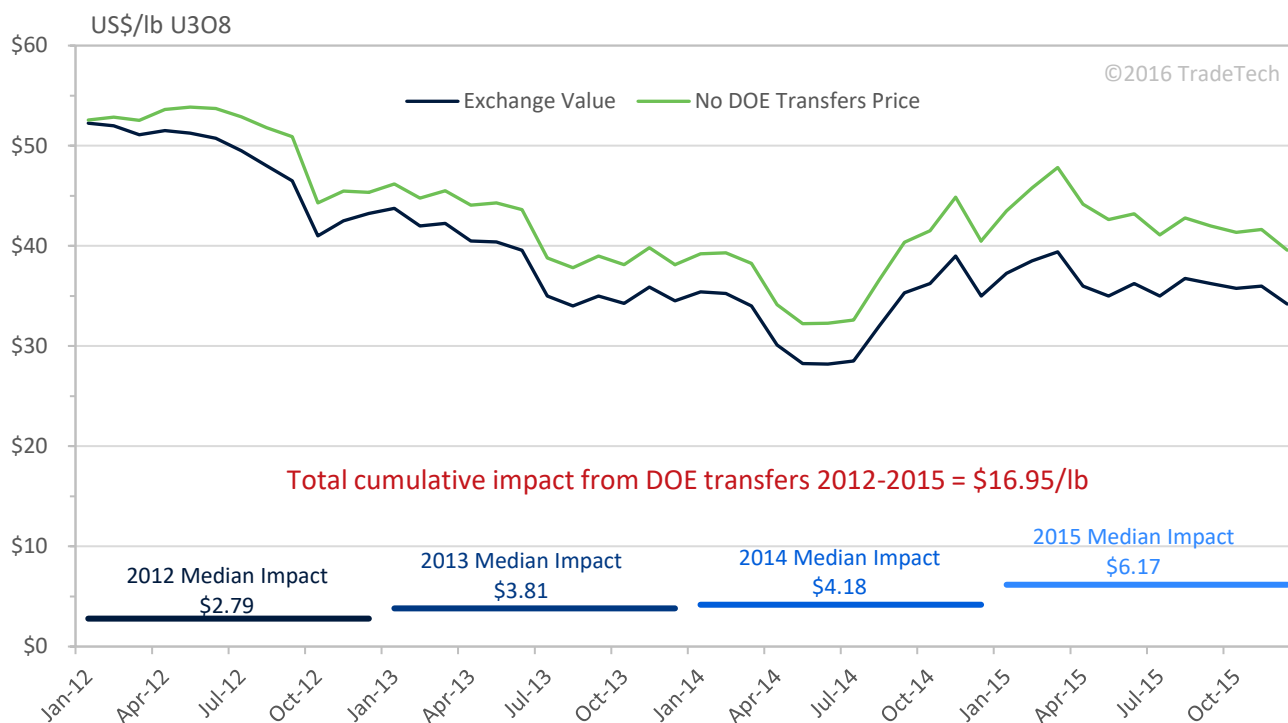
Notably, according to EIA, just six percent of purchases were of US-origin uranium in 2015, at a weighted-average price of \$43.86 per pound, five percent below the weighted-average price for all purchases. This decline is part of a larger-term trend in realized prices, and is expected to continue as legacy contracts signed over the last 10 years are fulfilled and fall out of portfolios. Declining uranium producer profit margins further reflect the circumstances that have defined the domestic uranium industry in the post-Fukushima period. In recent years, many uranium producers have interpreted persistently low spot prices, declining realized prices, low liquidity, and reduced appetite for term contracting among buyers as significant market signals and have consequently reduced, deferred, or mothballed production. Price-insulated, price-insensitive, and politically strategic supply sources are not responsive to such signals and continue to flow into the market, postponing a potential market recovery.

US Department of Energy (DOE) uranium transfers represent a key source of this material, amounting to approximately 44.6 million pounds U_3O_8 moved into the commercial market since 2008 under various Secretarial Determinations relating to the Department's *Excess Uranium Inventory Management Plan*. DOE excess material transfers have amounted to 37.3 million pounds U_3O_8 over the April 2011-July 2016 period.

In 2015, the oversupply condition intensified with supply exceeding demand, on average, by 1.5 million pounds per month or over 18 million pounds for the year. Global utility spot purchases amounted to just 11 million pounds U_3O_8 in 2015, which, in light of increased inventories in the USA, EU, and Asian markets, indicates discretionary buying. These conditions, generally, have persisted since early 2011, and have had a cumulative effect on the market where increased volumes of supply have led to an increasingly depressed uranium spot price.

TradeTech has estimated that the cumulative impact of these transfers on the Exchange Value (TradeTech's monthly U_3O_8 spot price) totaled \$16.95 per pound U_3O_8 in 2012-2015. The median impact for each individual year is shown in **Figure 3**.

Figure 3
Cumulative DOE Transfer Price Impact



For a producer with operating costs of \$35.90 per pound U₃O₈ and a 21 percent exposure to the spot market, reductions in realized prices (reported by EIA in 2015 to equal \$42.91 per pound U₃O₈), partly attributable to this negative price impact, result in increasingly reduced margins. On this basis, for a producer that is 100 percent exposed to the spot market, margins are reduced by approximately 35 percent; should that producer's realized prices equal today's spot prices, the gross loss is especially acute, resulting in a substantial net loss (with revenue totaling 35 percent less than costs).

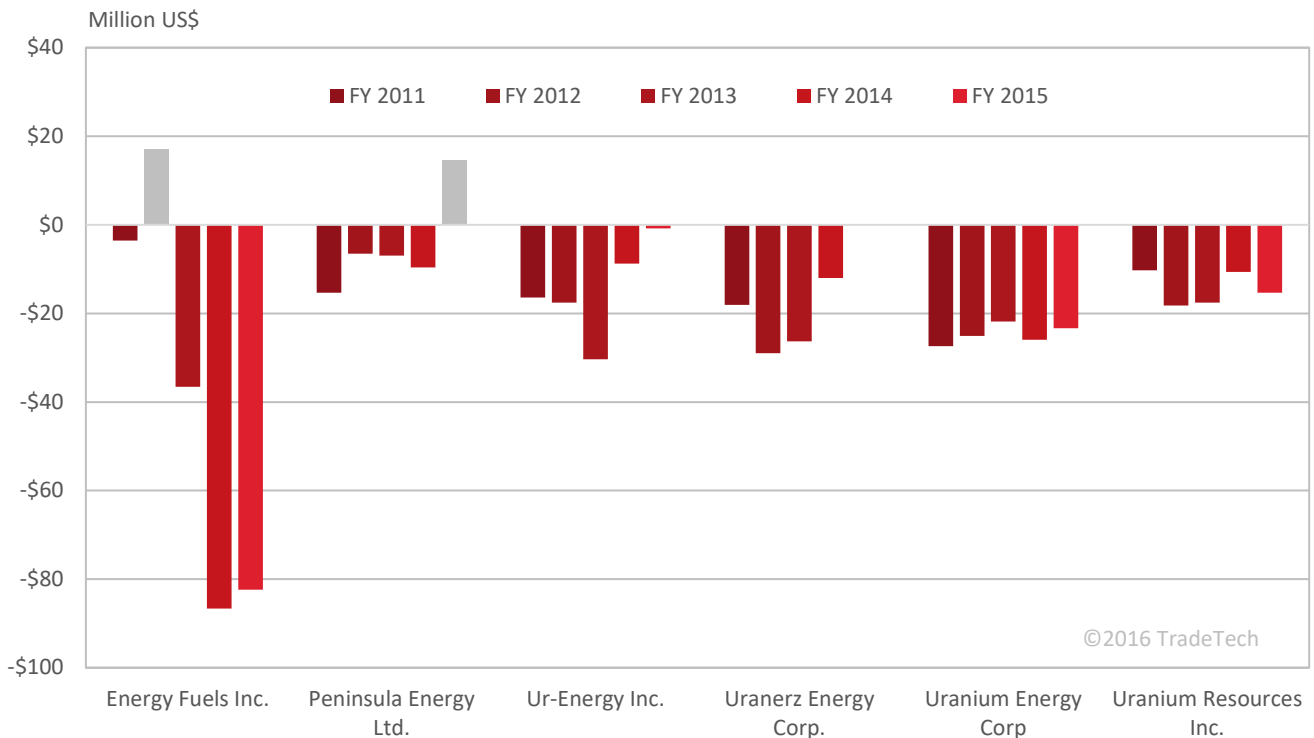
However, with average full costs estimated at \$66.85 per pound U₃O₈ and more producers necessarily embracing market-related contracts, the situation is increasingly untenable. US producers are facing increasingly severe economic challenges as term contracts cease to provide revenue support, largely due to utility access to price-insulated supply. As new contracts are increasingly tied to today's prices, TradeTech believes uranium prices have been impacted by a number of factors, including increased competition from price-insensitive suppliers such as DOE, persistent oversupply in the uranium market, and reduced demand as a result of premature nuclear power plant closures.

Cumulative Impact

The cumulative impact of these factors has had an adverse effect on growth in the US uranium market, the net result being fewer projects brought into production and, in fact, many that have been either deferred or mothballed. For both incumbent and potential suppliers, the ability to attract financing has been especially challenging in recent years as capital markets have generally taken a sober view of nuclear power's increasingly distant growth horizon. This is an especially salient point for US producers that are principally concerned with financing debt, which for some continues to grow with each year of only marginally marketable production.

Over the last six months, the long-run uranium spot price decline has gained momentum. This has served to highlight the fact that while a marginal spot price reduction that can be linked to a specific cause may not appear to be especially impactful in the short run, there appears to be a compounding accelerating effect when none of the factors abate for an extended period of time. And, while each dimension listed above could itself be considered unfavorable toward supply-side growth in any price environment, these factors combined have placed sustained downward pressure on uranium prices, the adverse material effect of which has been net losses totaling over \$105 million dollars for US uranium producers in 2015 (Figure 4). In fact, certain producers may not recover investments in their respective uranium mining assets and facilities in the foreseeable future due to the persistence of poor market conditions for the US uranium mining industry.

Figure 4
US Uranium Producers Net Loss, 2011-2015



Looking to the future, TradeTech’s models indicate that DOE material transfers entering the spot uranium will continue to have a measurable adverse material impact on uranium market prices and, by extension, uranium producers. If DOE were to completely cease material transfers, then producers would see improvement in the market.