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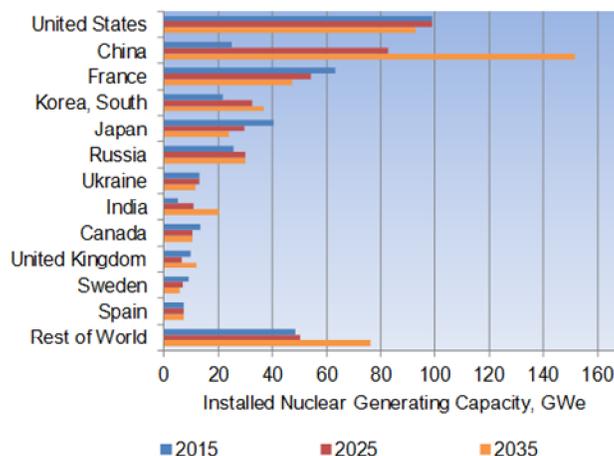
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## ERI Releases 2016 Nuclear Fuel Cycle Supply and Price Report

Energy Resources International, Inc. (ERI) has published its 2016 Nuclear Fuel Cycle Supply and Price Report (2016 Report). The 2016 Report provides comprehensive and in-depth analyses of the markets for uranium concentrates, conversion services, enrichment services, fuel fabrication services and spent fuel management through 2035. The market assessment for front-end nuclear fuel components relies on ERI's proprietary *Integrated Market Model* (IMM). The IMM projects worldwide forecasts for nuclear power and integrates these nuclear power forecasts and associated nuclear fuel requirements and demand with nuclear fuel supply forecasts. The 2016 Report (i) examines the key nuclear fuel requirements and supply issues likely to affect the uranium, conversion, enrichment and fuel fabrication markets as well as spent fuel management, and (ii) projects future long-term market prices and market shares.

### Status and Prospects for Nuclear Power

As of the end of 2015, world commercial nuclear power generation capacity stood at 381.1 gigawatt electric (GWe) net at 435 operating units in 31 countries around the world, providing 11% of total world electric generation. Net generation capacity increased 4.4 GWe in 2015 (1.2%). While new reactors are entering service worldwide, particularly in China, ERI forecasts that world capacity, which has been adjusted to include only Japanese reactors which are projected to restart in the future, will not return to the pre-Fukushima level until the second half of 2018. As shown in the figure below, long-term growth is expected worldwide, even though declines are likely in Western Europe, Japan and the U.S., as the center of gravity for nuclear growth has shifted to China, Korea, India and the Middle East. An increasing number of planned shutdowns in countries such as the U.S., Sweden and France remains worrisome.



Comparison of Installed Nuclear Generation Capacity for Top Countries

## **Uranium Market**

The uranium market continues to be characterized by oversupply, which is forecast to continue through the mid-2020s, as inventories are worked off and reactor requirements increase. Total World requirements are projected to rise from 163 million pounds in 2015 to an average of 169 million pounds in the 2017 to 2021 period. Modest but steady growth then takes place and requirements reach 229 million pounds in 2035, not including inventory building and discretionary purchases, with much of the growth arising in East Asia. Total mine production for 2015 is estimated to have been 158 million pounds, an 8% increase from 2014. Uranium mining is largely concentrated in 11 countries, which account for 97% of all of the uranium mined during the past ten years. The top 3 countries – Kazakhstan, Canada and Australia – were the source of 71% of all uranium mined in 2015. In terms of individual suppliers, eleven suppliers controlled 87% of world uranium production in 2015.

## **Conversion Services Market**

During 2015, investments in existing and new conversion facilities continued in France and Russia. AREVA continues to make progress with construction of the new conversion facilities at Malvesi and Pierrelatte, the Comurhex II project. AREVA planned to close the Comurhex I plant by mid-2015. However, current plans are for Comurhex I to operate until December 2017 in order to smoothly transition to Comurhex II operation. Rosatom subsidiary, Joint Stock Company (JSC) TVEL, is also in the process of modernizing and consolidating its conversion production capability with construction of a new conversion production center at the Siberian Chemical Combine (SCC), receiving environmental approvals for the project in 2015. The first stage of the new facility is expected to be commissioned in 2019. World requirements under the ERI Reference Nuclear Power Growth forecast for uranium in all forms – i.e., as UF<sub>6</sub>, uranium tetrafluoride (UF<sub>4</sub>) and uranium trioxide (UO<sub>3</sub>) – are projected to rise gradually from 55.5 million kgU in 2015 to 85.8 million kgU by 2035. The world's existing and expected future sustainable primary production is expected to rise from an estimated 43 million kgU as UF<sub>6</sub> in 2015 to more than 85 million kgU as UF<sub>6</sub> in 2035, as capacity in China expands to meet its growing nuclear fuel requirements.

## **Enrichment Services Market**

While enrichment market activity increased slightly in 2015, the first time that has happened since 2008, the enrichment market continues to be characterized by long-term over supply. The reduction in Japanese and German demand as well as premature reactor closures in other countries resulted in excess primary supply, the accumulation of excess inventory and limited contracting opportunities, all of which have led to ever increasing downward pressure on prices. Major supply expansion at several sites has now been completed. AREVA increased Georges Besse II (GB II) capacity to 7.4 million SWU and Urenco USA capacity increased to 4.6 million SWU by the end of 2015. Urenco USA capacity will slowly increase to 5.7 million SWU by 2022. However, market conditions have made it impossible to proceed with new green-field capacity as GE-Hitachi decided to exit the Global Laser Enrichment venture. Over supply and low market prices led Urenco to mothball a "modest" amount of older U.K. capacity. Rosatom continues to modernize capacity at its existing plants in Russia, but the pace of capacity expansion has slowed. China's continues to ramp up internal enrichment capacity to match requirements and is moving to increase

its currently limited presence as an international supplier. Nuclear power plant enrichment requirements decreased by 1% to 41.9 million SWU in 2015; however, steady growth is expected as enrichment requirements climb to an estimated 72 million SWU per year between 2031 and 2035.

### **Fuel Fabrication Market**

In the fuel fabrication services market, existing facilities in the U.S. and Europe and expansion of facilities in East Asia are continuing to support fuel fabrication services for existing and new nuclear power plants. Fuel fabrication capacity remains idle in Japan, while fabricators undergo safety assessments under new safety regulations and await the restart of Japanese nuclear power plants. The idle Japanese plants have resulted in a buildup of enriched uranium inventories at both enricher and fuel fabricator sites, with several fabricators in the U.S. seeking license amendments to increase their capacity to store enriched uranium. During the past year, Westinghouse Electric Company made further inroads into the market for Russian-supplied VVER fuel designs, signing contracts with Ukraine's Energoatom and with Cez for supply of lead test assemblies (LTA) for the Temelin plant in the Czech Republic. With a limited and shrinking BWR fuel market, in May 2016 Global Nuclear Fuels (GNF) announced that it planned to form a strategic alliance with Rosatom's TVEL Fuel Company to license, market and fabricate fuel for U.S. PWRs that utilize the Westinghouse 17x17 lattice design. These actions by Westinghouse, GNF and TVEL could dramatically change the world market for PWR fuel over the next decade.

### **Spent Fuel Storage and Disposal**

As of May 2016, nuclear power plants in approximately 21 countries have implemented dry storage of spent nuclear fuel (SNF) in both at-reactor and away-from-reactor (AFR) dry storage facilities, ten countries are storing SNF in AFR wet storage facilities, and approximately eight countries have programs to reprocess some or all SNF at domestic reprocessing facilities or at a facility in another country. In the U.S. alone, a total of 108 nuclear power plants at 66 sites have loaded SNF into dry storage in at-reactor dry storage facilities and several other plants are poised to begin loading during 2016. In the U.S., approximately 26,500 metric tons of heavy metal (MTHM) of SNF has been loaded into dry storage in an estimated 2,200 dry storage packages. At year-end 2015, approximately 284,000 MTHM of SNF was in either wet or dry storage at nuclear power plant sites, AFR storage facilities, or storage facilities at reprocessing facilities worldwide. In addition to SNF currently in storage worldwide, more than 100,000 MTHM of SNF from civilian nuclear power plants has been reprocessed.