

# **GLE Commercial Facility Mandatory Hearing**

## **ASLB Presentation Topic #5A Detailed Review of the Need for Future Enrichment Capability**

Michael H. Schwartz  
Chairman of the Board  
Energy Resources International, Inc.  
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# Presentation Overview

- Detailed analysis has been performed of supply and requirements for uranium enrichment services over the period 2012 through 2035.
- Analysis accounts for the near-term and potential long-term effects of the events of the last several years, including the Fukushima Daiichi accident, world economic downturn, and growing expectations for availability of low cost natural gas.
- Scenarios have been considered with and without the introduction of proposed new enrichment facilities that may be built and operated in the U.S., including the GLE Commercial Facility.
- Expectations for world and U.S. are presented.

# Forecasts of Installed Nuclear Generation

- ERI estimates the impact of Fukushima accident to be about a 4 year slippage in previously expected level of installed world nuclear generation by 2030.
- ERI Reference Nuclear Power Growth forecast, after accounting for events of the last several years, still reflects a 58% increase in worldwide installed nuclear generation capacity through 2035; and a 9% increase in the U.S. during this same period.
- ERI forecast of installed nuclear generation is conservative when compared to other forecasts – i.e., ~9% below the average of all forecasts during the 2020 to 2030 time period.

# **Forecasts of Requirements for Uranium Enrichment Services**

- Based upon its forecast for installed nuclear generation, the ERI Reference Nuclear Power Growth forecast for the 2031– 2035 period reflects a 76% worldwide increase in requirements for enrichment services relative to the present; and a 37% increase in the U.S. during this same period.
- ERI Reference Nuclear Power Growth forecast of enrichment requirements is conservative as compared to other available forecast – i.e., ~16% below the World Nuclear Association Reference forecast during the 2016 – 2030 time period.
- Differences result from differences in forecasts of installed nuclear generation, tails assay, and assumptions regarding nuclear fuel cycle designs.

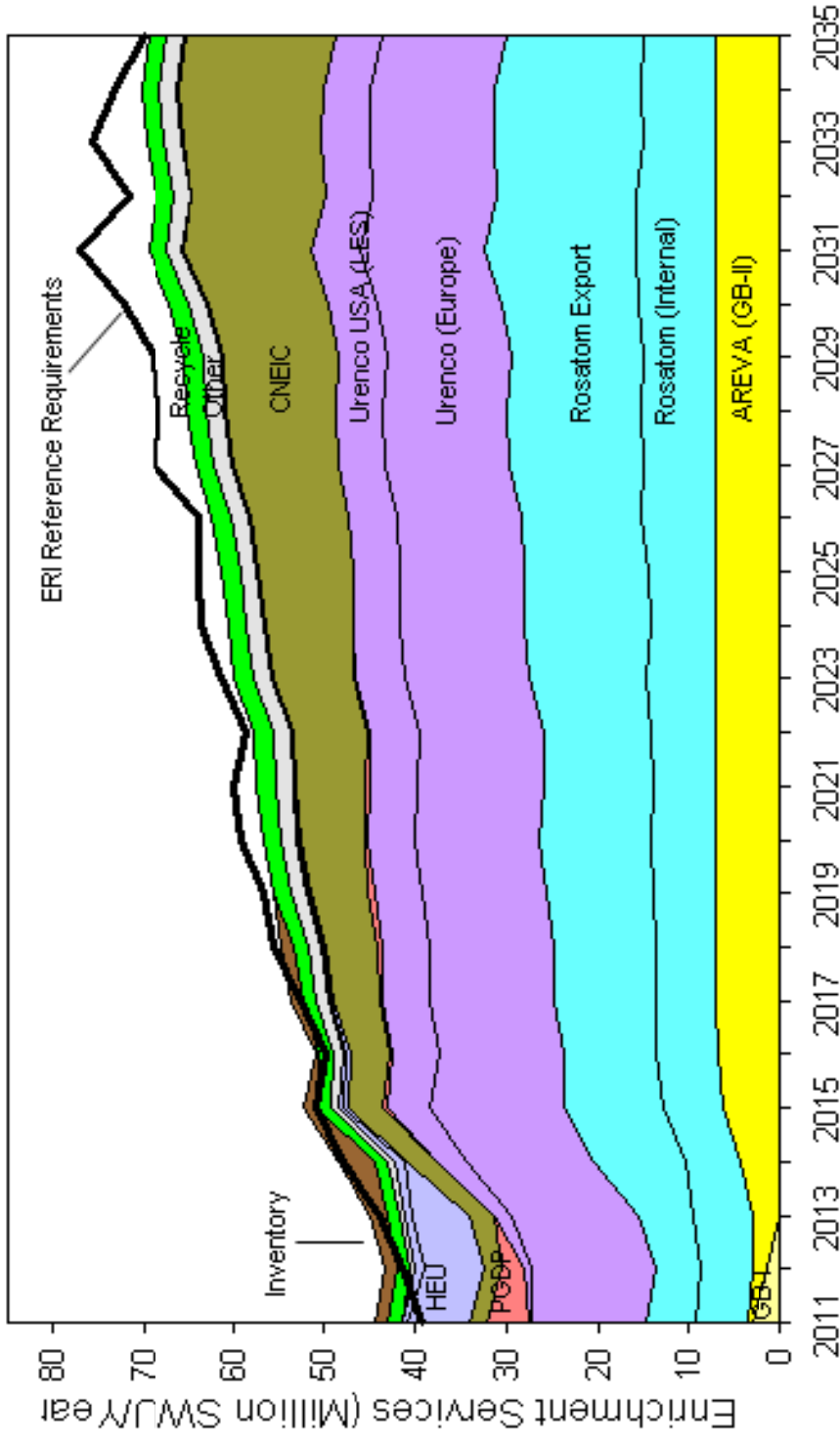
# Existing and Projected Enrichment Supply – U.S.

- During the past year, the level of uncertainty has grown regarding future U.S.-based enrichment supply capability.
  - USEC Paducah GDP – operation is expected through 2013; and use of pre-produced inventory is intended to support transition to USEC ACP.
  - LES Urenco USA – NRC license awarded in June 2006; operational in June 2010; continuing ramp up to expected 5.9 million SWU per year by 2016, which will require license amendment.
  - USEC ACP – NRC license awarded in April 2007; initial operation had been expected in 2014, followed by ramp up to 3.8 million SWU per year by 2018. However, ACP financing remains uncertain as do prospects and schedule.
  - AREVA EREF – Awarded conditional DOE loan guarantee in May 2010; NRC license awarded in October 2011 for 6.6 million SWU per year. However, prospects and schedule remain uncertain following project being placed on indefinite suspension in February 2012.
  - U.S. DOE down blended HEU – annual supply of 1 million SWU in 2012, which is expected to decline to 0.2 million SWU by 2020, and continue at that level.
  - Capacity made available for enrichment of uranium is expected to be slightly lower than licensed capacity of facilities for both domestic and foreign enrichers due to underfeeding to produce uranium for sale.

# Existing and Projected Enrichment Supply – Non-U.S.

- **Outside the U.S., there also have been some changes**
  - AREVA GB I GDP – permanently shut down on June 7, 2012; pre-produced inventory is being used to support transition to GB II.
  - AREVA GB II – operational as of April 2011; continuing ramp up to 7.5 million SWU per year by 2017.
  - Urenco Europe – operation and expansion continuing at multiple facilities; steady state annual capacity of 14.7 million SWU expected by end of 2012.
  - Rosatom – U.S.-Russia HEU Agreement ends in 2013. Expansion continuing as expected. Sales in U.S. and Europe constrained by trade laws. Contracts executed to support limited access to U.S. and elsewhere.
  - China – expectations for indigenous Chinese enrichment capacity have increased significantly over past several years to reflect significant increase in expectations for enrichment requirements and desire for self sufficiency.
  - Recycle – expected as a long-term source of about 2.1 million SWU per year equiv.

# Adequacy of World Supply Relative to Forecast Requirements



- Assumes Base Supply and ERI Reference Nuclear Power Growth forecast requirements for enrichment services
- Assumes that the proposed AREVA/EREF, GEH/GLE and USEC/ACP are not constructed.

# **Summary of World Enrichment Supply vs. Requirements**

- Under the ERI Reference forecast, at least one of the proposed sources of supply (i.e., AREVA/EREF, GEH/GLE, USEC/ACP) is necessary to meet world requirements through 2035, but with little margin.
- Under the ERI High forecast all three proposed sources of supply are necessary to meet world requirements through 2025, but are inadequate to meet requirements through 2035.
- Under the ERI Low forecast none of the proposed sources of supply are necessary to meet U.S. requirements through 2035.
- Under the WNA Reference forecast all three proposed sources of supply are necessary to meet world requirements through 2030.



# **Summary of U.S. Enrichment Supply vs. Requirements**

- Under the ERI Reference forecast, all three of the proposed sources of supply (i.e., AREVA/EREF, GEH/GLE, USEC/ACP) are necessary to meet U.S. requirements through 2035.
- Under the ERI High forecast all three proposed sources of supply are necessary to meet U.S. requirements through 2035.
- Under the ERI Low forecast at least two of the three proposed sources of supply are necessary to meet U.S. requirements through 2035.
- Under the WNA Reference forecast all three proposed sources of supply are necessary to meet world requirements through 2030.

# Tabular Summary of World & U.S. Results Enrichment Supply vs. ERI Requirements

Time Period	Reference Nuclear Power Growth		High Nuclear Power Growth Forecast		Low Nuclear Power Growth Forecast	
	Million SWU per Year (Percent of Requirements)		Million SWU per Year (Percent of Requirements)		Million SWU per Year (Percent of Requirements)	
	2016-2025	2026-2035	2016-2025	2026-2035	2016-2025	2026-2035
World						
Potential Supply - None	-1.3 (-2.2%)	-3.8 (-5.4%)	-8.1 (-11.3%)	-17.5 (-17.3%)	+3.7 (+7.5%)	+4.7 (+9.8%)
Potential Supply - 1 of 3	+0.8 to +3.9 (+1.4% to +6.7%)	+0.0 to +2.2 (+0.0% to +3.1%)	-6.0 to -2.9 (-8.4% to -4.0%)	-13.7 to -11.5 (-13.6% to 11.4%)	+5.8 to +8.9 (+11.8% to +18.1%)	+8.5 to +10.7 (+17.6% to +22.2%)
Potential Supply - 2 of 3	+4.1 to +7.2 (+7.1% to +12.4%)	+5.8 to +8.0 (+8.2% to 11.3%)	-2.7 to +0.4 (-3.8% to +0.6%)	-7.9 to -5.7 (-7.8% to -5.6%)	+9.1 to 12.2 (+18.5% to 24.7%)	+14.3 to +16.5 (+29.7% to 34.2%)
Potential Supply - All	+9.3 (+16.0%)	+11.8 (16.6%)	+2.5 (+3.5%)	-1.9 (-1.9%)	+14.2 (+29.0%)	+20.3 (+42.1%)
U.S.						
Potential Supply - None	-10.0 (-63.3%)	-11.3 (-67.3%)	-10.8 (-65.1%)	-13.8 (-71.5%)	-8.9 (-60.5%)	-7.3 (-57.0%)
Potential Supply - 1 of 3	-6.1 to -4.8 (-38.6% to -30.4%)	-5.3 to -2.5 (-31.5% to -14.9%)	-6.6 to -5.5 (-39.8% to -33.1%)	-7.8 to -4.4 (-40.4% to -22.8%)	-5.1 to -3.7 (-34.7% to -25.2%)	-1.3 to +0.8 (-10.2% to +6.2%)
Potential Supply - 2 of 3	-4.7 to -1.6 (-29.7% to -10.1%)	-1.7 to +0.5 (-10.1% to +3.0%)	-5.5 to -2.4 (-33.1% to -14.5%)	-4.2 to -2.0 (-21.8% to -10.4%)	-3.6 to -0.5 (-24.5% to -3.4%)	+2.3 to +4.5 (+18.0% to +35.2%)
Potential Supply - All	+0.5 (+3.2%)	+4.3 (+25.6%)	-0.3 (-1.8%)	+1.8 (+9.3%)	+1.6 (+10.9%)	+8.3 (+64.8%)
Base Supply is included in all cases.						
Potential Supply includes AREVA/EREF, GEH/GLE, USEC/ACP.						

- Highlighted scenarios indicate supply shortage is forecast to occur.

# Conclusions

- All three proposed facilities are needed to avoid a shortage of U.S.-based supply during the 2016 – 2035 time period under the ERI Reference Nuclear Power Growth forecast.
- At least one of the proposed sources of supply is necessary to meet world requirements through 2035, but with little margin, under the ERI Reference forecast.
- All three proposed sources of supply are necessary to meet world requirements through 2030 under the WNA Reference forecast.
- Given the uncertainties with the other proposed U.S.-based projects, the GEH/GLE Commercial Facility is needed.