IAEA Report:
Uranium Supply To 2060

International Symposium on Uranium Raw Material for the Nuclear Fuel Cycle: Exploration, Mining, Production, Supply and Demand, Economics and Environmental Issues
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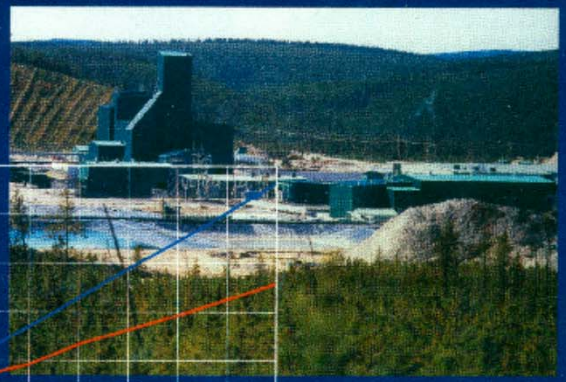
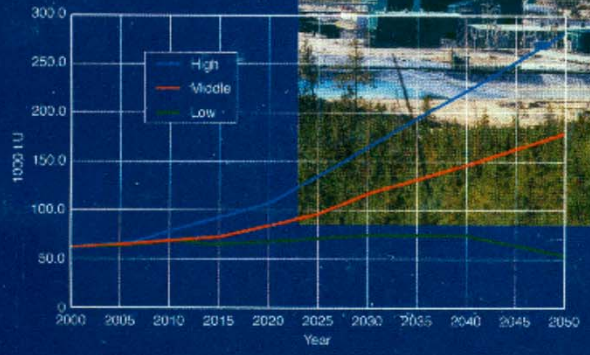
Outline

- Background
- Uranium Requirements
  - Reactor Requirements
  - Inventory Accumulation
- Uranium Supply
  - Secondary Supply
  - Resource Base
  - Primary Production
- Supply – Demand Balance
- Conclusions

Analysis of Uranium Supply to 2050



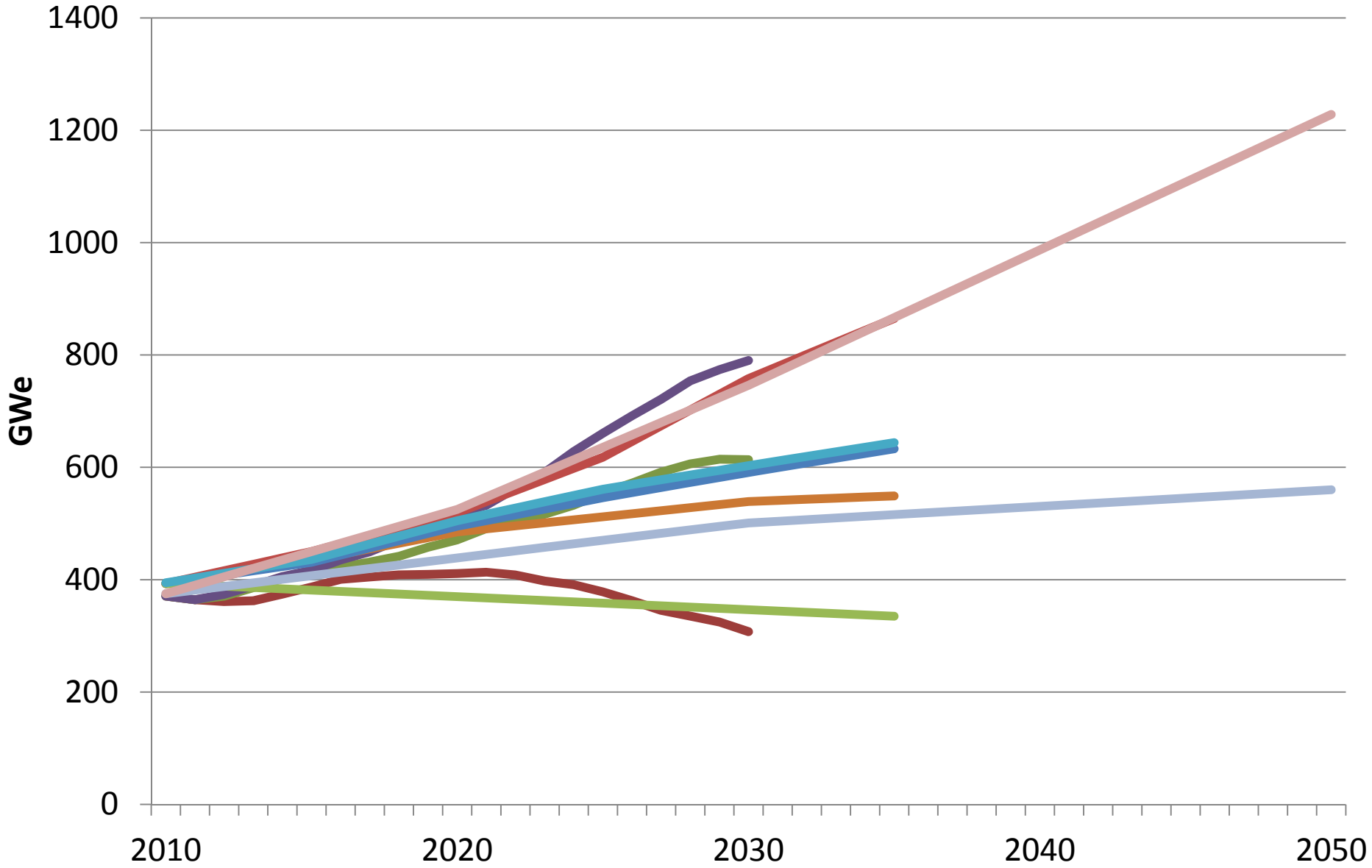


INTERNATIONAL ATOMIC ENERGY AGENCY

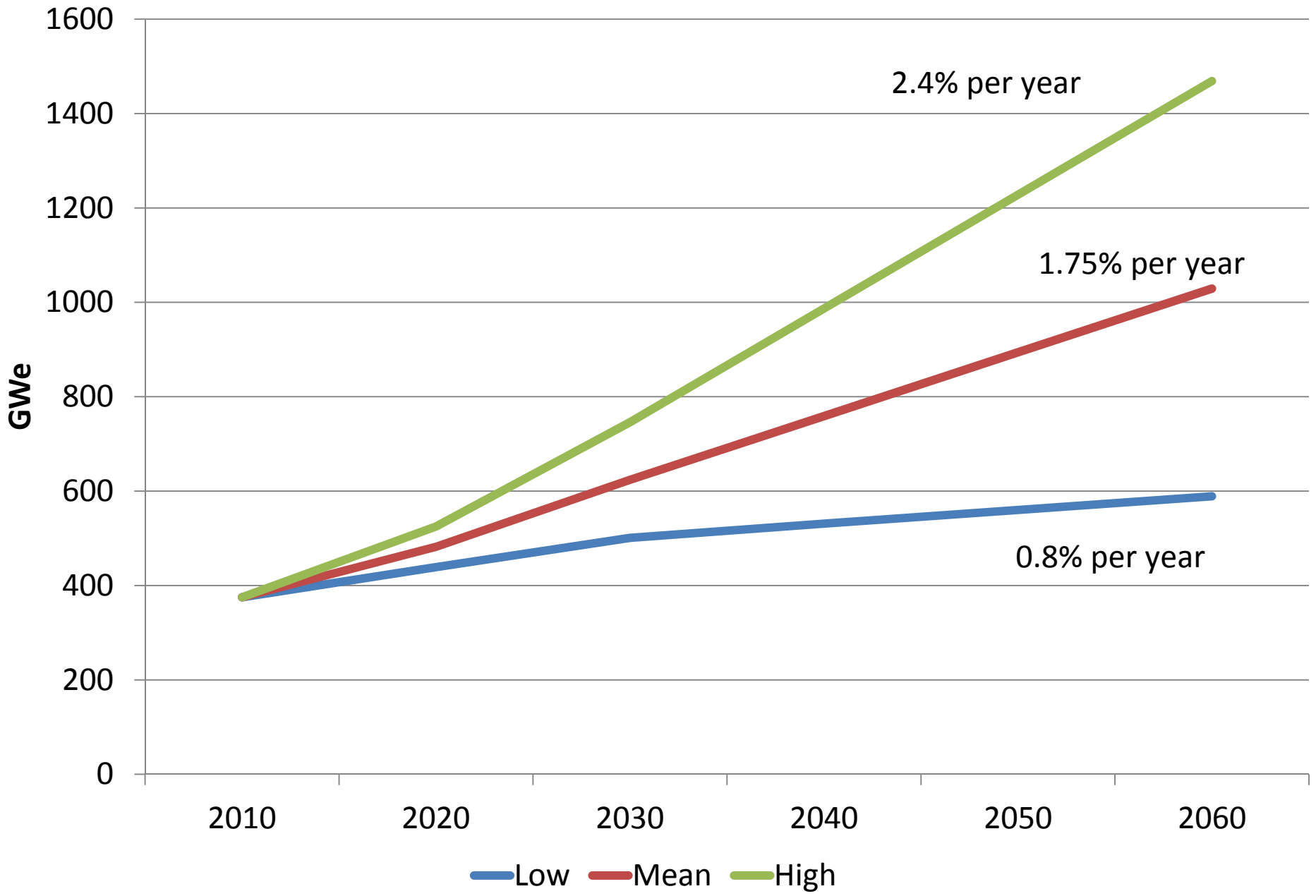
Uranium Requirements

- Available Projections – Installed Capacity
  - World Nuclear Association – 2011
    - 2005 to 2030
  - International Energy Agency – 2011
    - 2010 to 2035
  - U. S. Energy Information Administration – 2011
    - 2008 to 2035
  - International Atomic Energy Agency – 2011
    - 2010 to 2050

Installed Nuclear Capacity Projections
2011



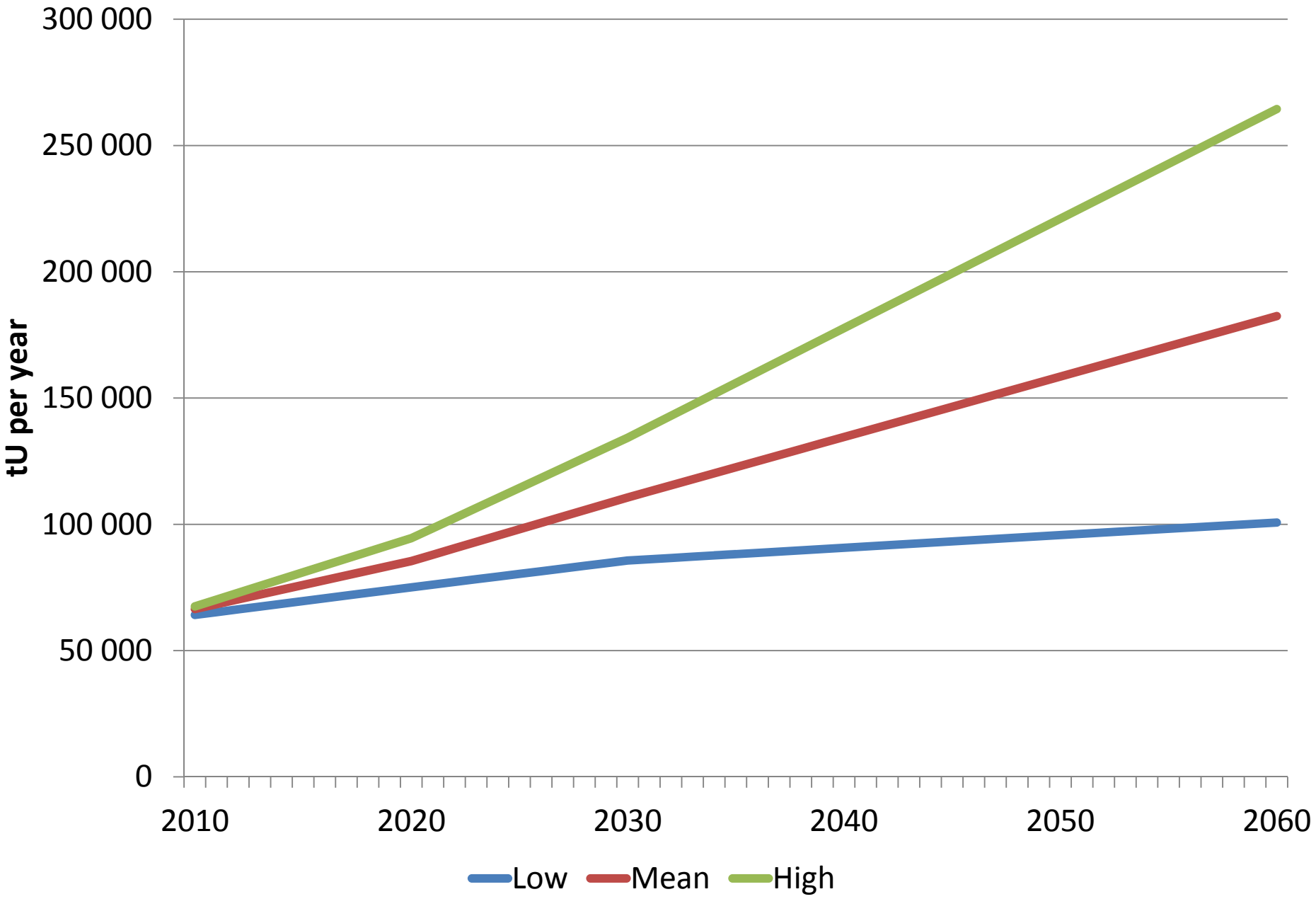
Projected Nuclear Capacity



Conversion From Capacity To Uranium Requirements

- Determine “Fuel Intensity”
  - Average of calculations from WNA “Global Nuclear Fuel Market” and NEA/EIA “Uranium 2009: Resources, Production and Demand”.
  - High Case = 180 tU per year per GWe
  - Mean Case = 177.3 tU per year per GWe
  - Low Case = 171 tU per year per Gwe
  - High & mean cases are higher due to more initial cores.

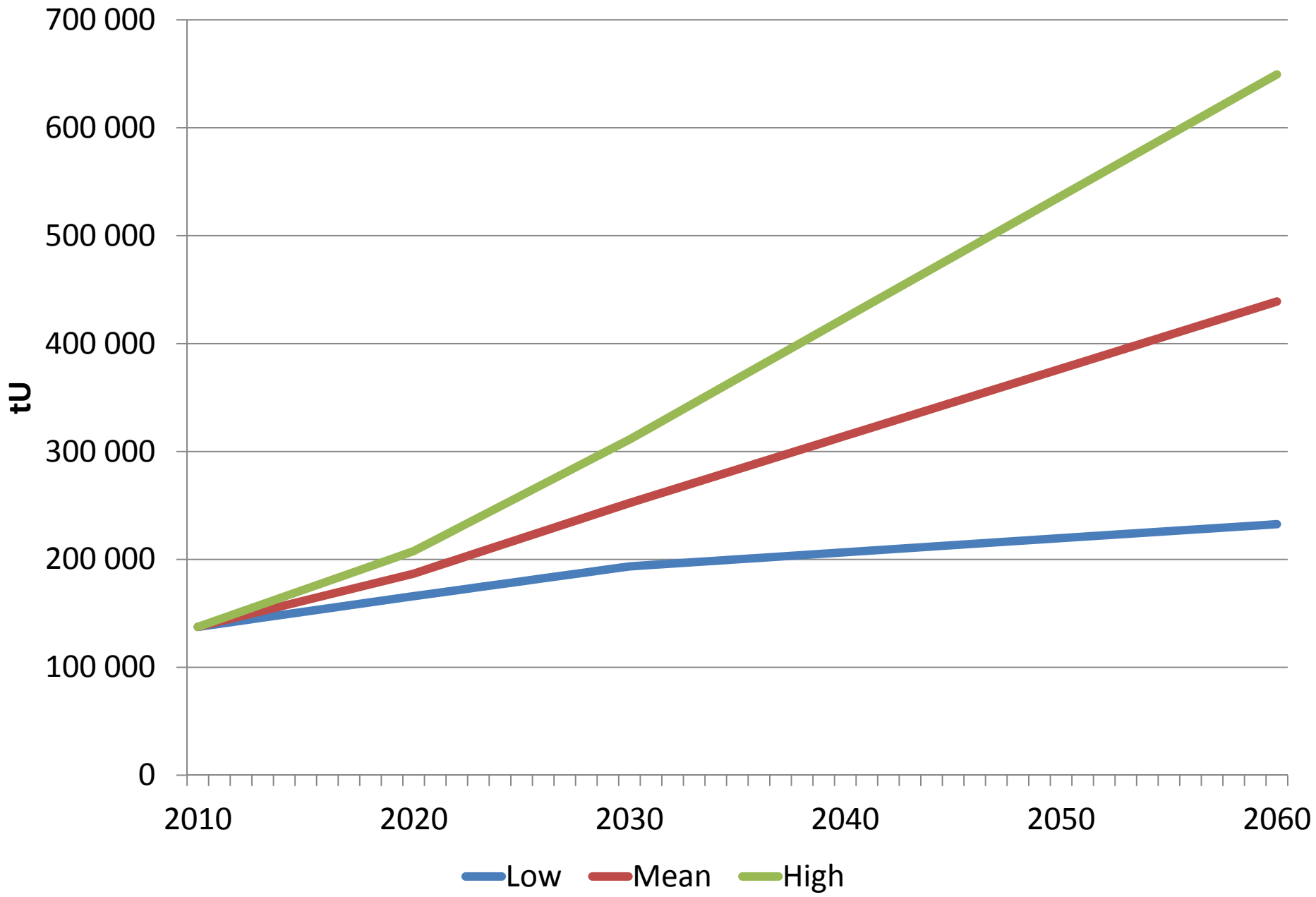
Reactor Requirements



Commercial Inventory Accumulation

- Utilities: 2.0 years forward requirements
- Producers: 0.5 years forward supply
- Brokers/Traders/Investors: 10% of annual requirements

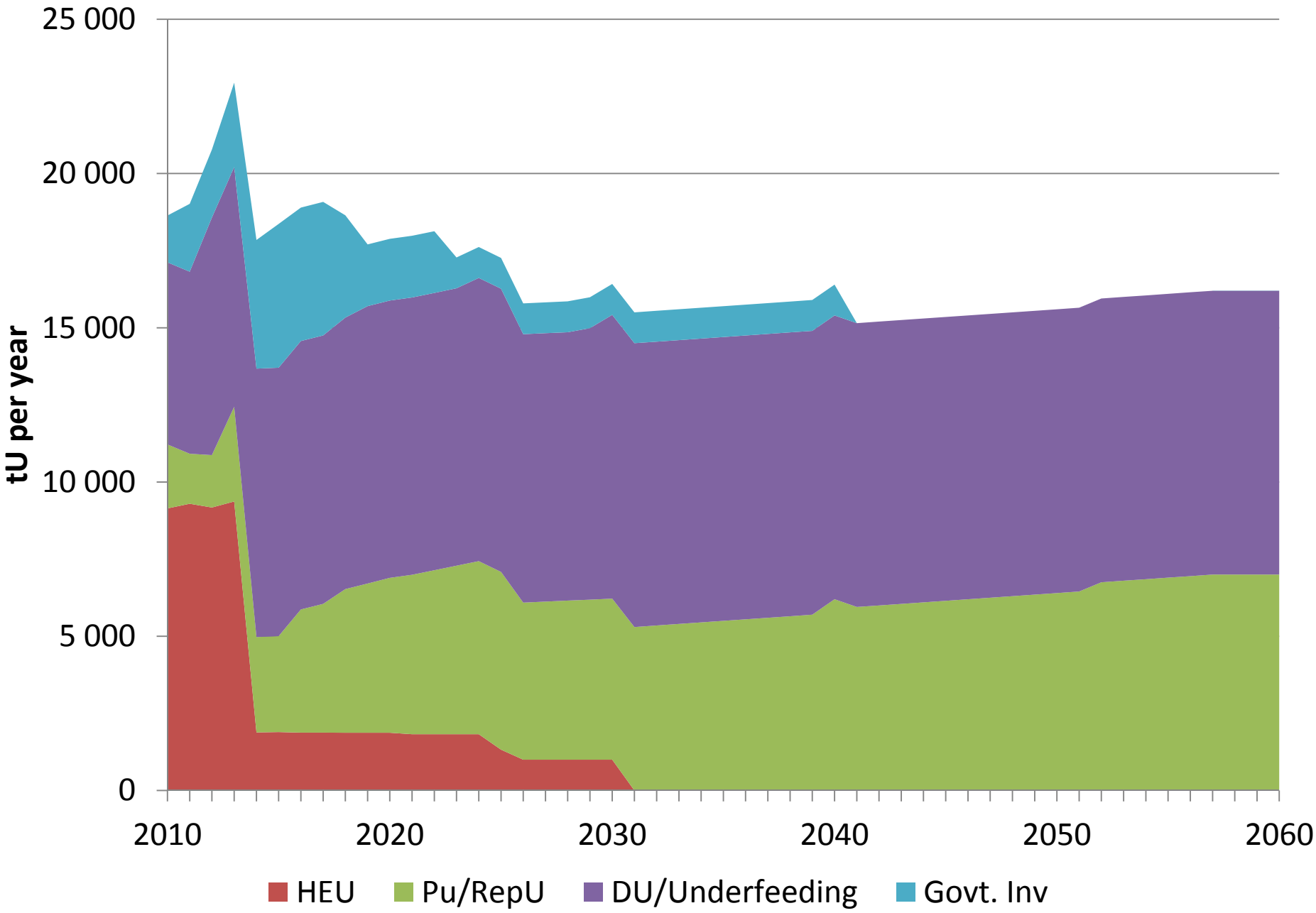
Commercial Inventories - Total



Secondary Supply

- Highly enriched uranium (HEU)
- Reprocessed uranium (RepU) from spent nuclear fuel
- Plutonium for mixed oxide fuel (MOX)
- Depleted uranium in the form of enrichment tails (DU) and underfeeding
- Government holdings of natural (NU) and low enriched uranium (LEU)

Secondary Supply



Primary Production Requirements

Reactor Requirements

Plus

Inventory Accumulation

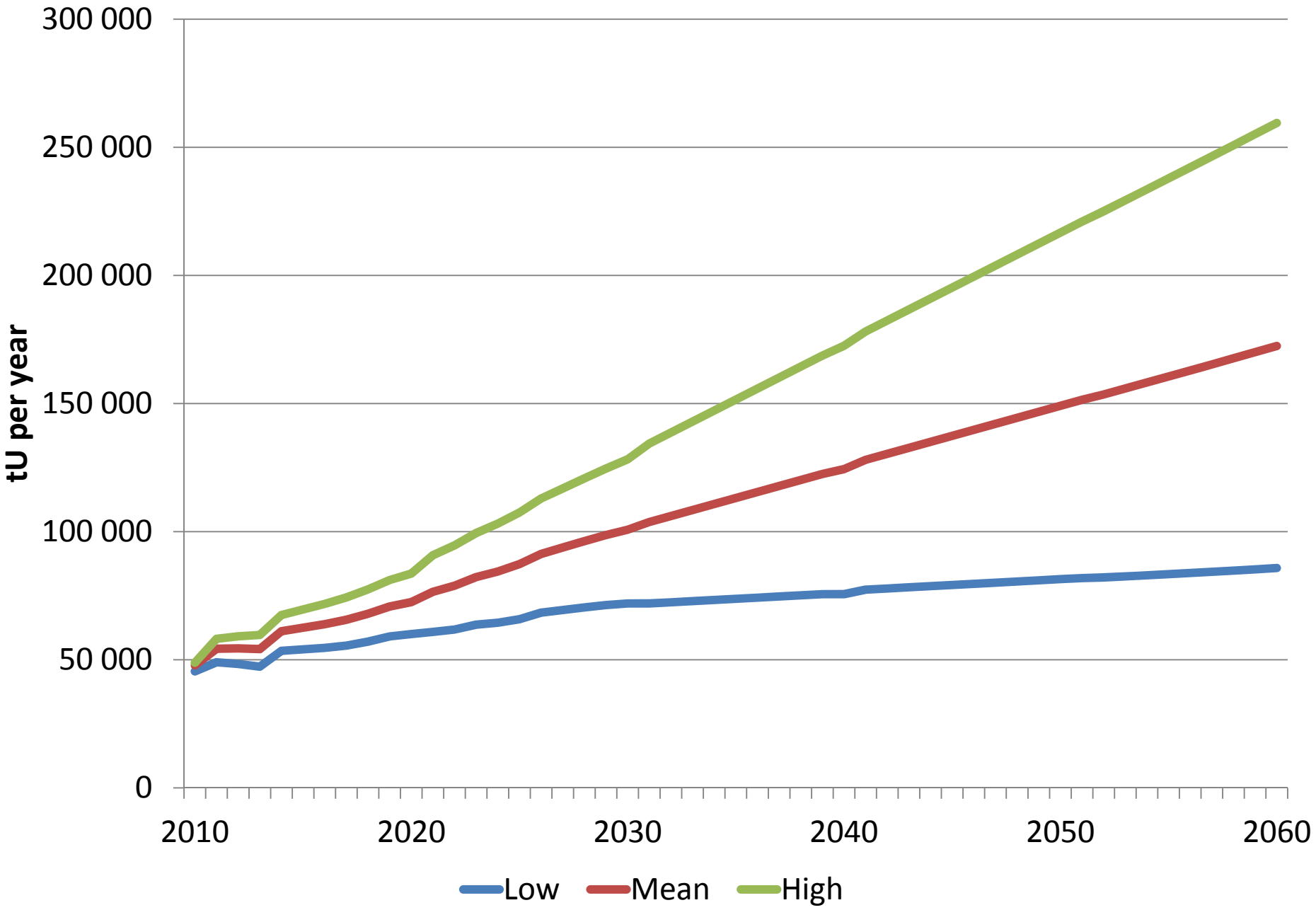
Less

Secondary Supply

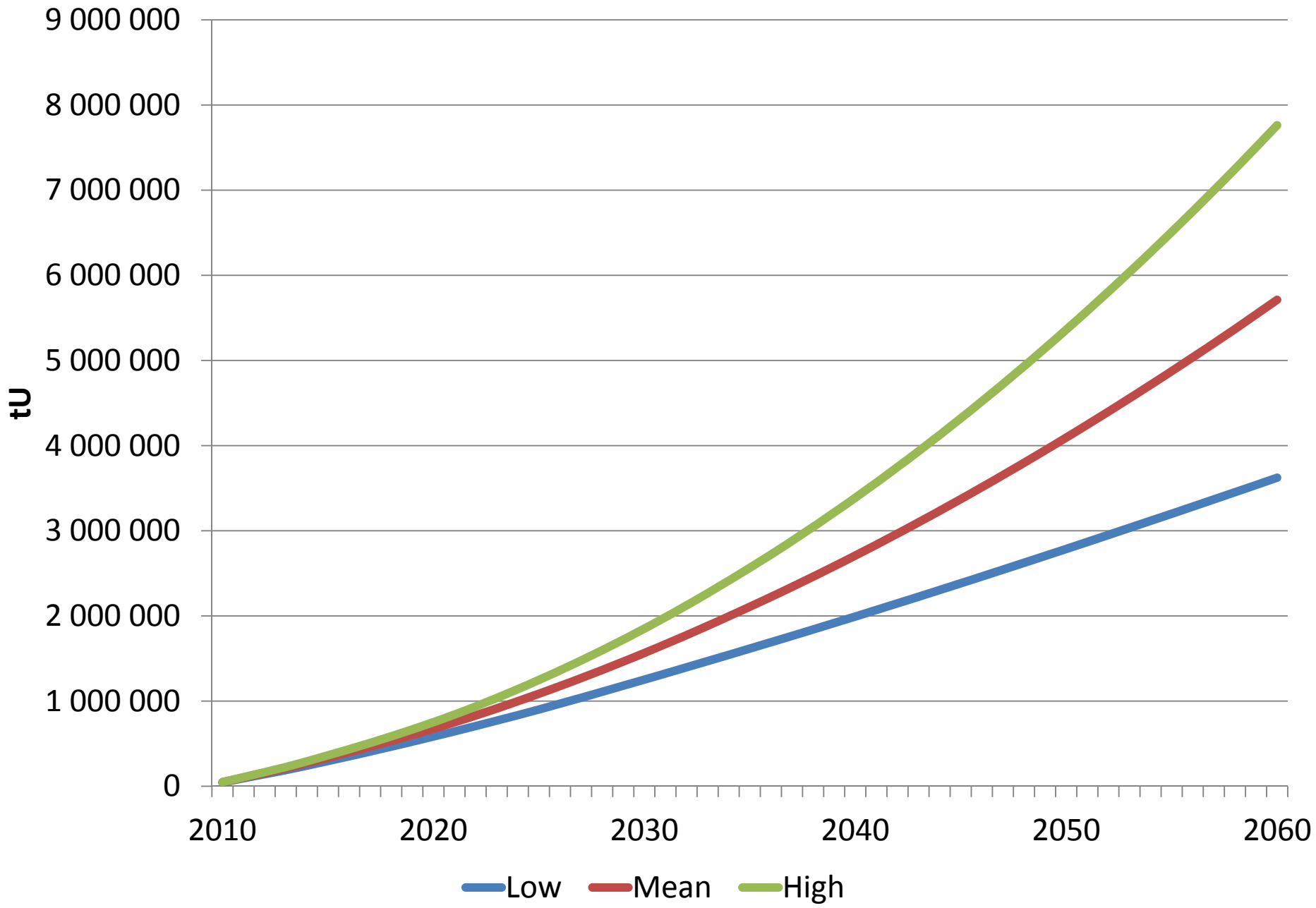
Equals

Primary Production Requirements

Primary Production Requirements



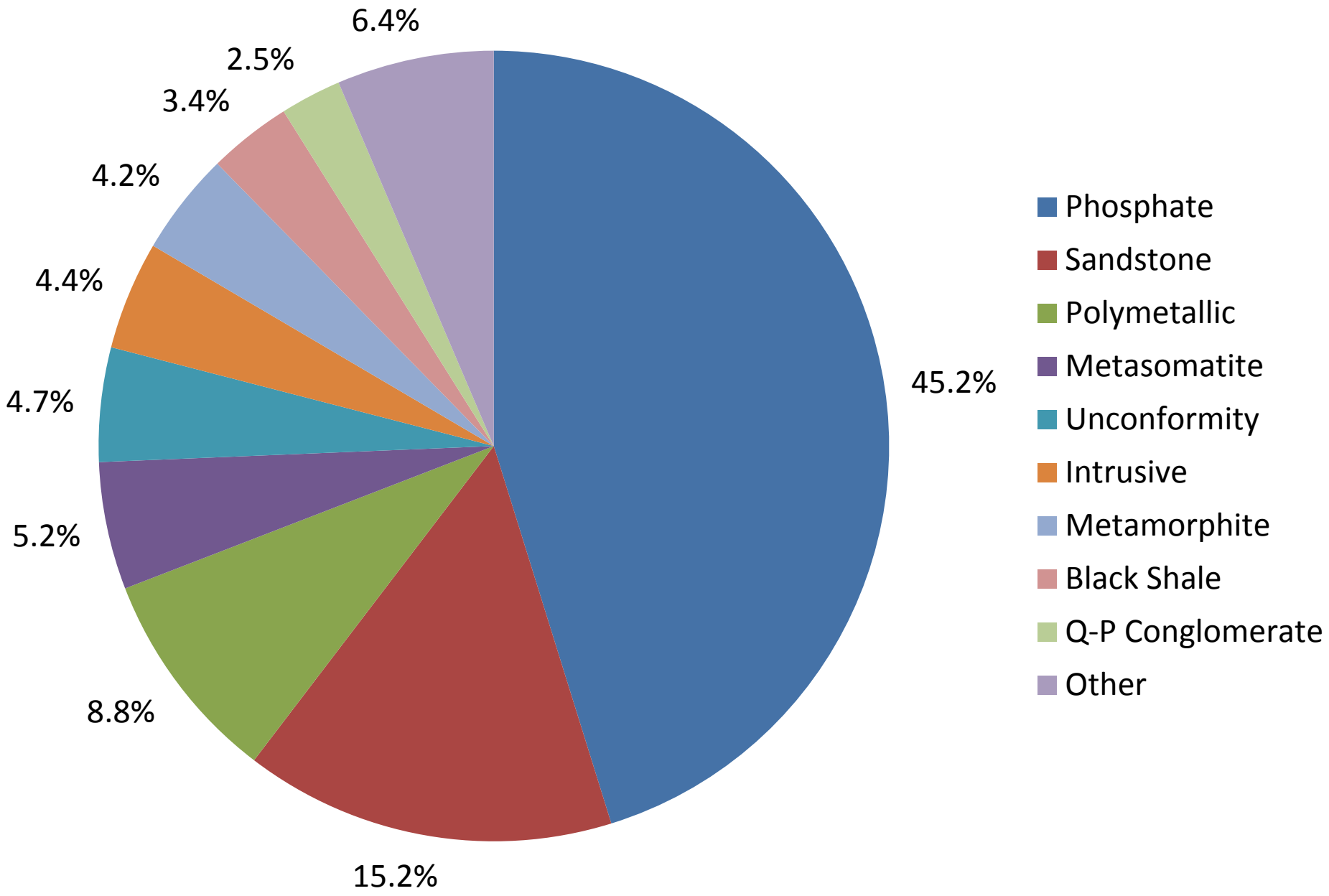
Cumulative Primary Production Requirements



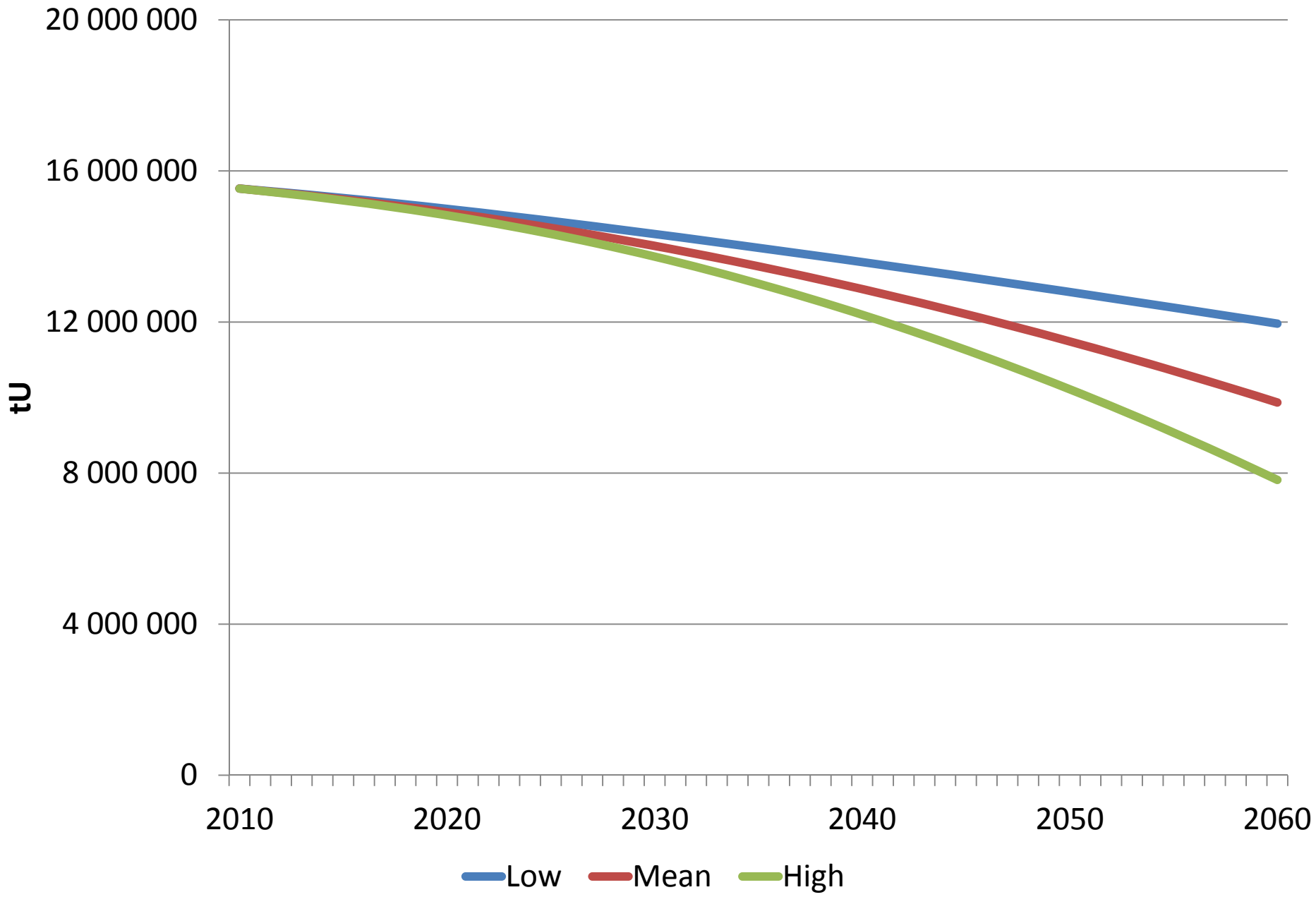
World Uranium Resources by Deposit Type
As Defined by the UDEPO Database

Type of Deposit	Resources (tU)	% of Total
Phosphate	7,042,191	45.2%
Sandstone	2,364,768	15.2%
Polymetallic	1,365,024	8.8%
Metasomatite	812,413	5.2%
Unconformity	728,007	4.7%
Intrusive	691,102	4.4%
Metamorphite	655,761	4.2%
Black Shale	530,627	3.4%
Q-P Conglomerate	389,908	2.5%
Volcanic related	339,451	2.2%
Surficial	280,028	1.8%
Gold Tailings	143,888	0.9%
Granite related	138,610	0.9%
Carbonate	50,000	0.3%
Lignite-Coal	40,000	0.3%
Collapse breccia pipe	9,154	0.1%
Total	**15,580,932**	**100.0%**

Resource Distribution by Deposit Type



Remaining Resources



Conclusion

Existing uranium resources will not constrain the use of nuclear power in the next half century.