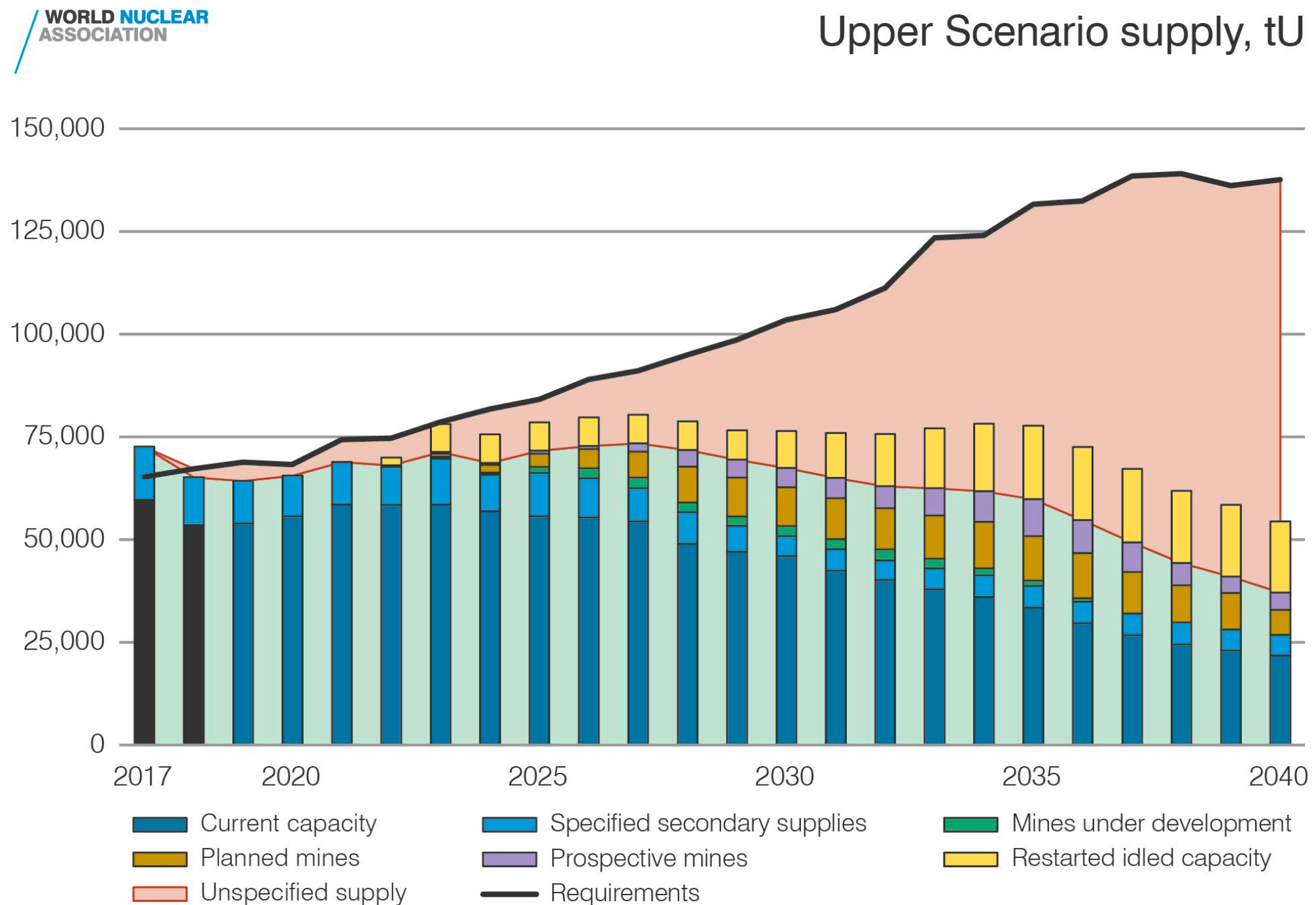


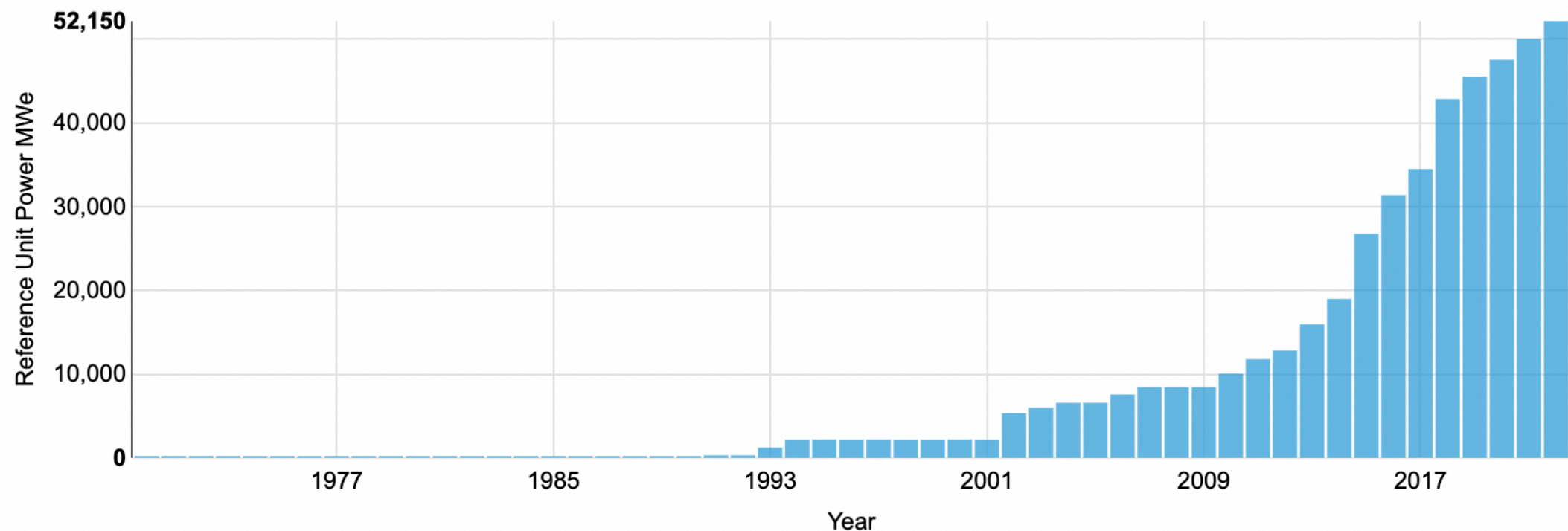
## Uranium: Looming supply shortage requiring higher prices



## **Nuclear is a *GROWTH SECTOR*:**

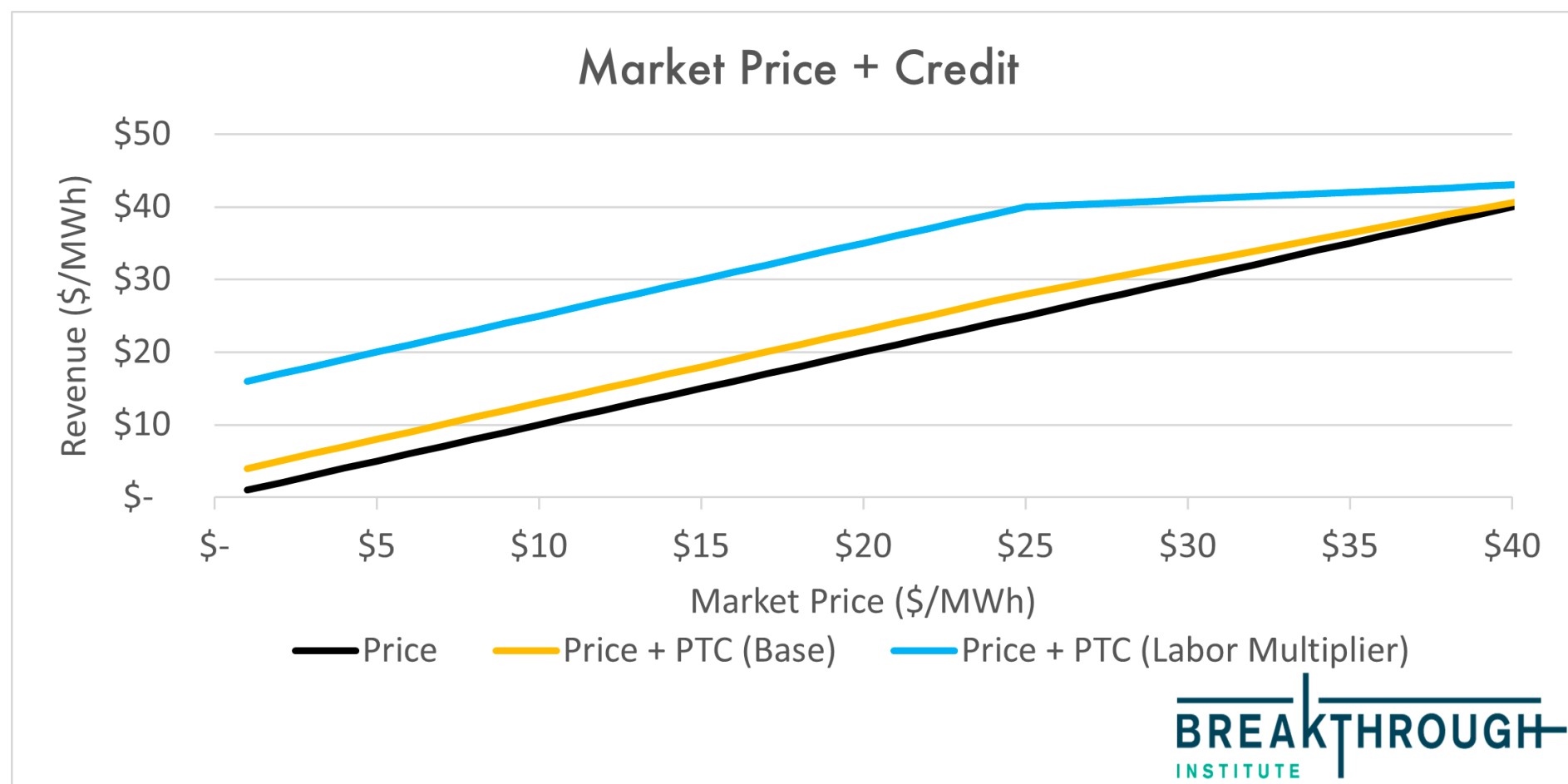
- 60 reactors currently under construction (58 GW)
- 112 reactors planned (120 GW)
- 324 reactors proposed (357 GW)

China: 22 reactors under construction; 200GW by 2035



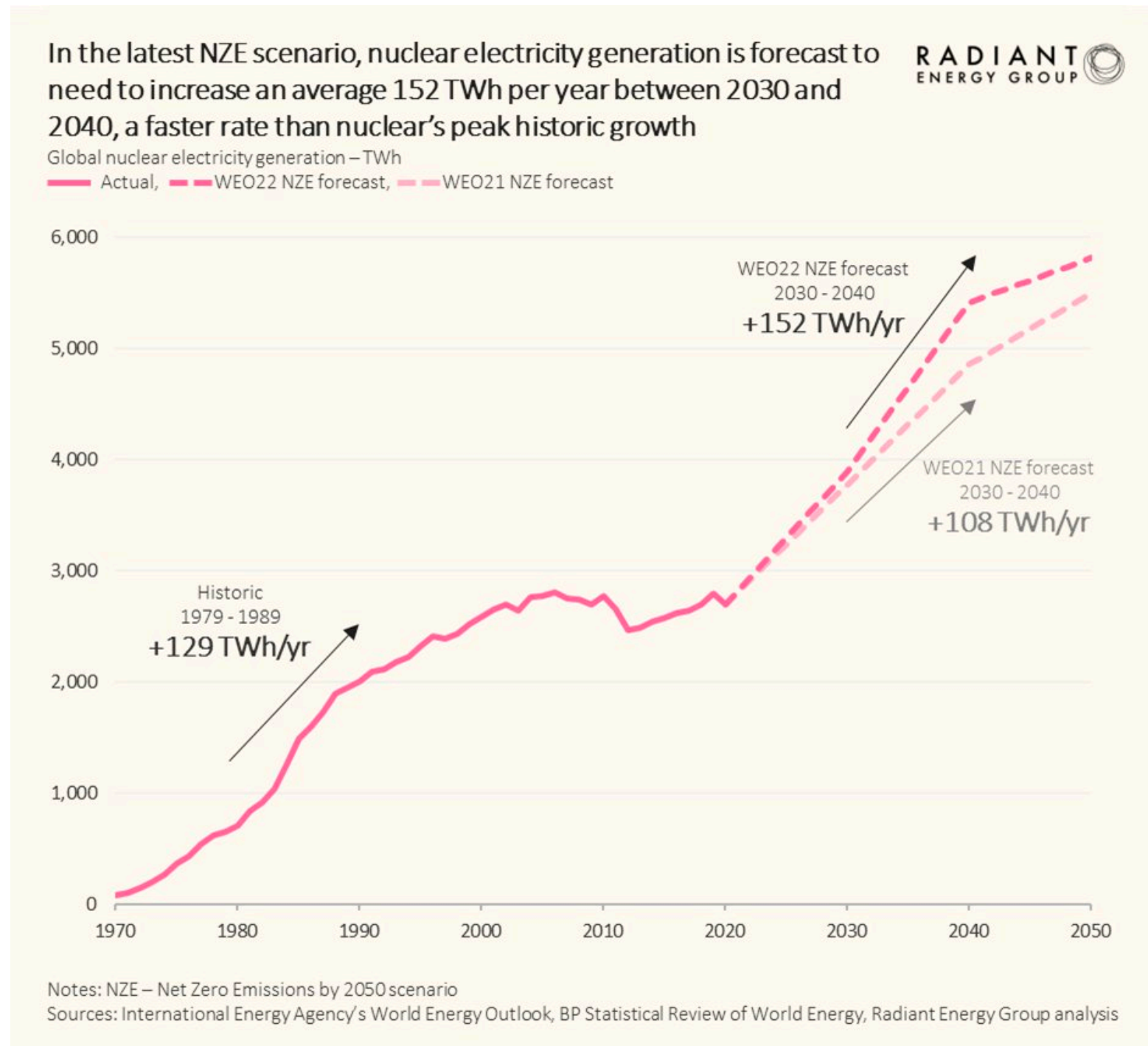
## Inflation Reduction Act de-risks US nuclear fleet:

- Clean energy **Production Tax Credits** to support existing reactors (eg. Diablo Canyon now seeking 20-year extension *beyond 2030*)
- **Investment Tax Credits** – Advanced Nuclear / SMRs



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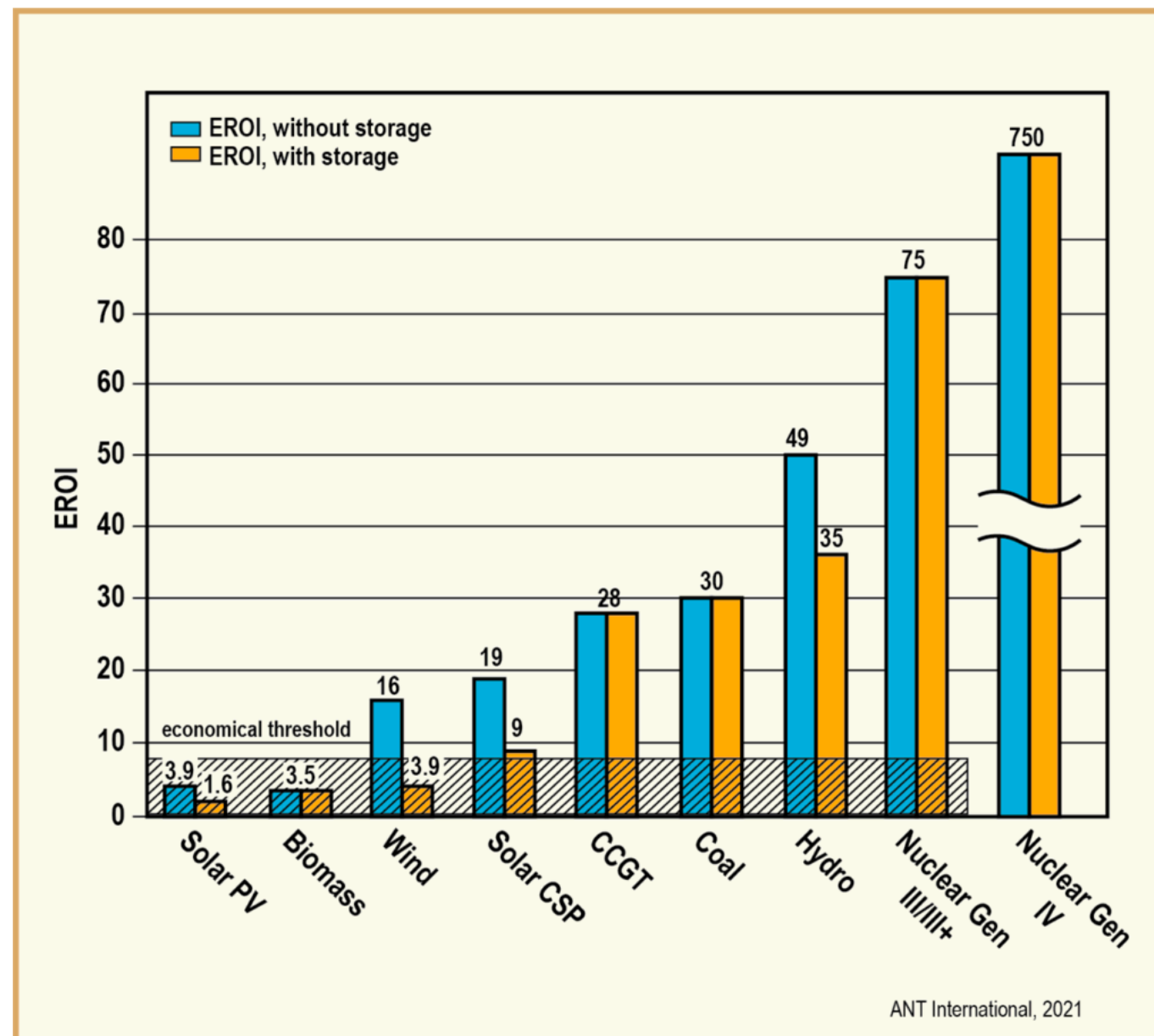
**IEA's World Energy Outlook** – proposing an increase to 5,413TWh of nuclear by 2040...a more than doubling of current capacity.



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**EROI: Energy Return On Energy Invested** – Nuclear (and especially ‘advanced’ nuclear) has orders of magnitude greater EROI than all other energy sources.

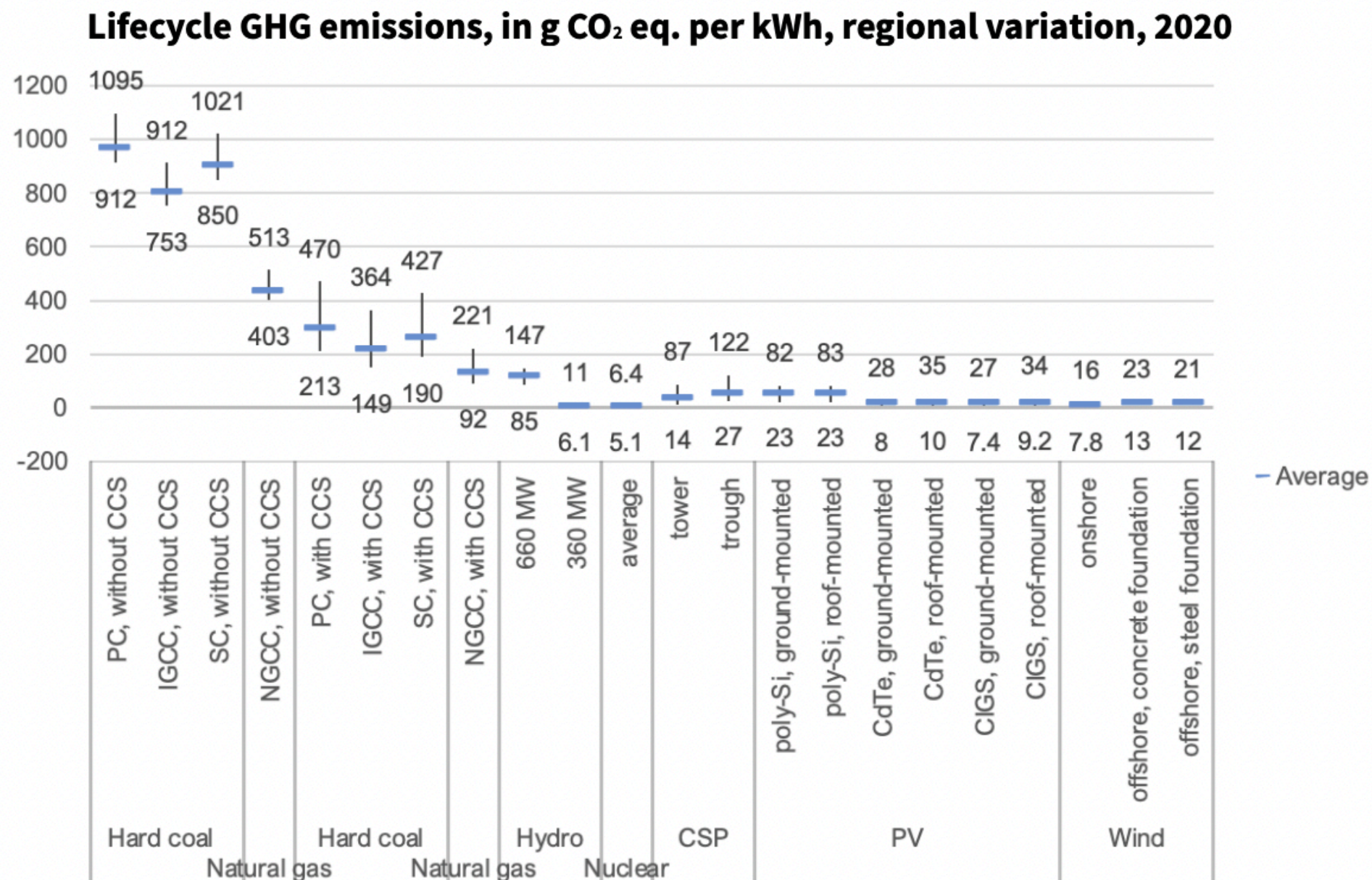
\*Modern civilized society requires a MINIMUM of an EROI of 7-10:1





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**Nuclear** = lowest GHG emissions / kWh of ALL energy sources.

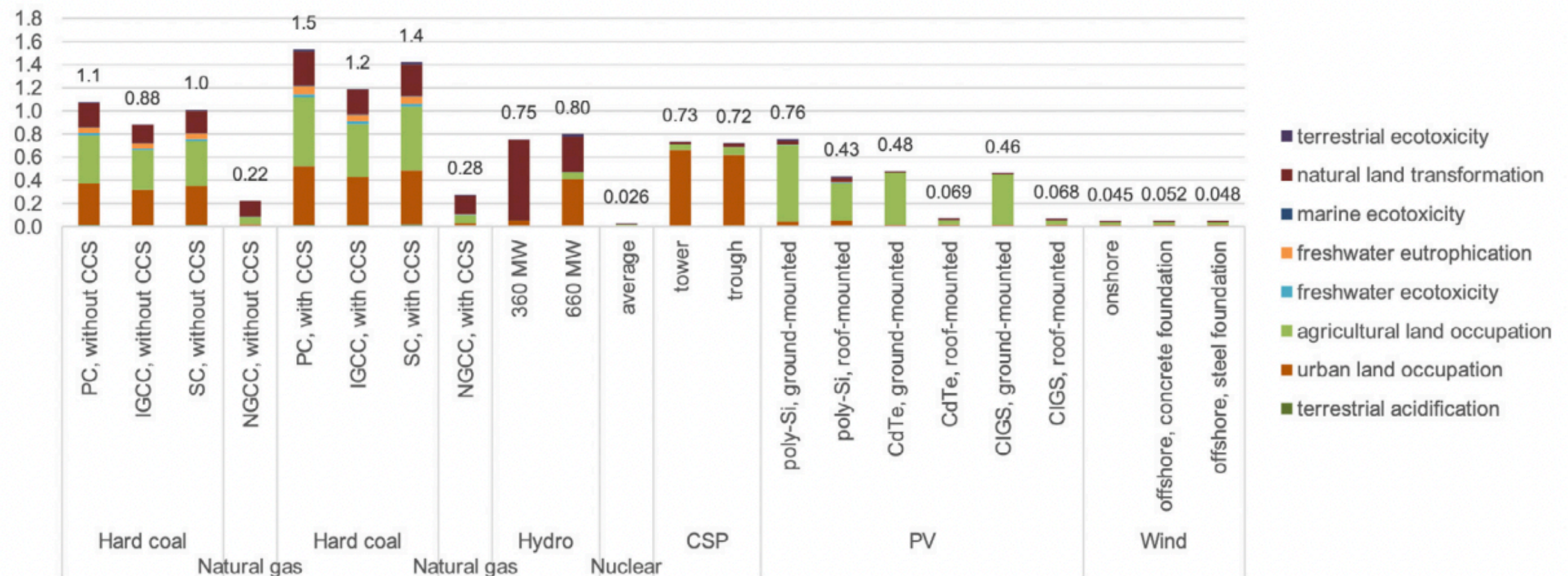


UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

**Nuclear** = Lowest life cycle ecosystems impact.

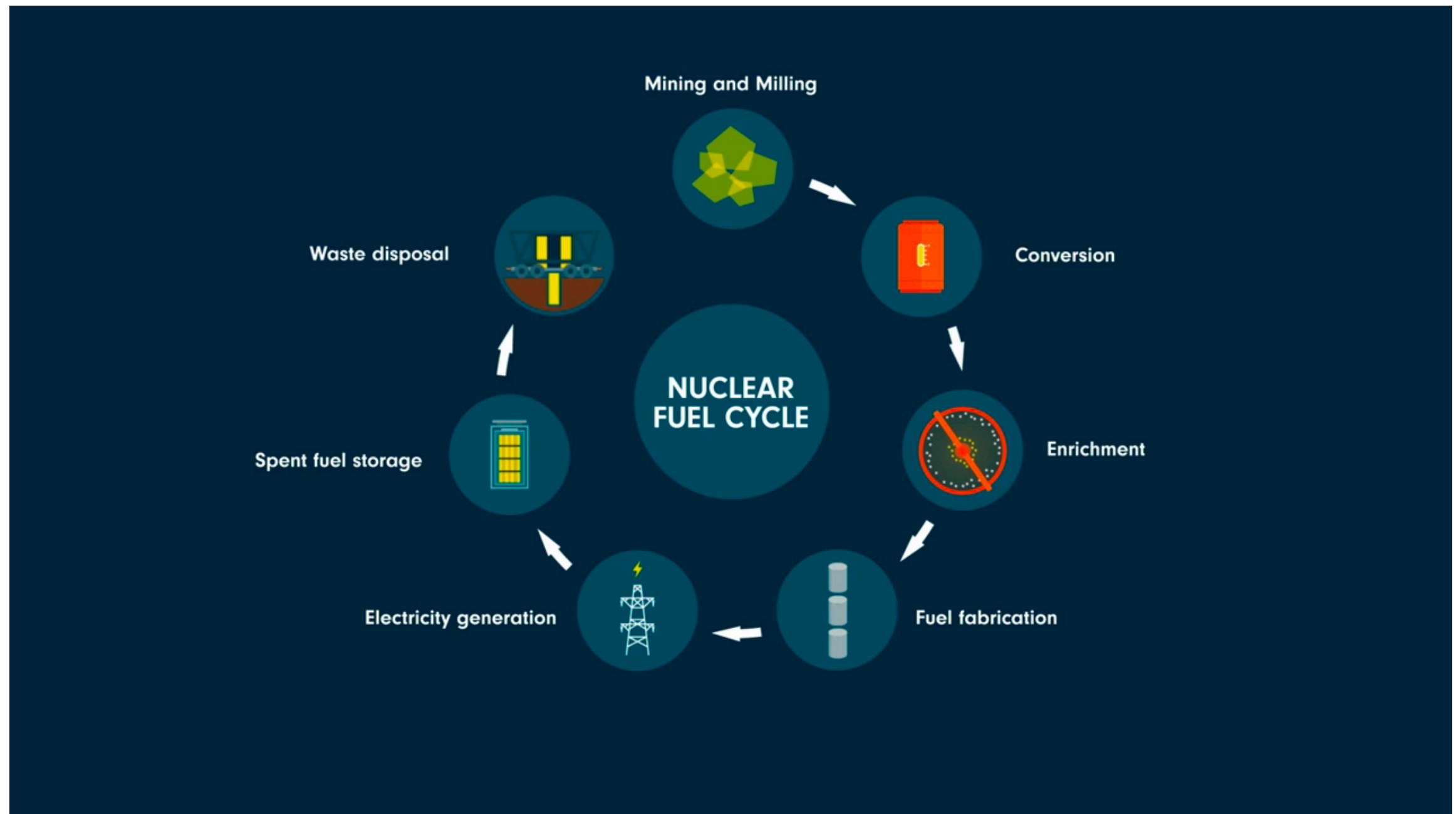
**Figure 49** Life cycle impacts on ecosystems, in points, excluding climate change.  
Note on unit: 1 point is equivalent to the impacts (in species-year) of 1 person (globally) over one year.

## Life cycle impacts on ecosystems, no climate change, per MWh, in points



UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

**Nuclear Fuel Cycle:** 18-24 months from mining to fabricated fuel.





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## Russia / Ex-Russia Bifurcation:

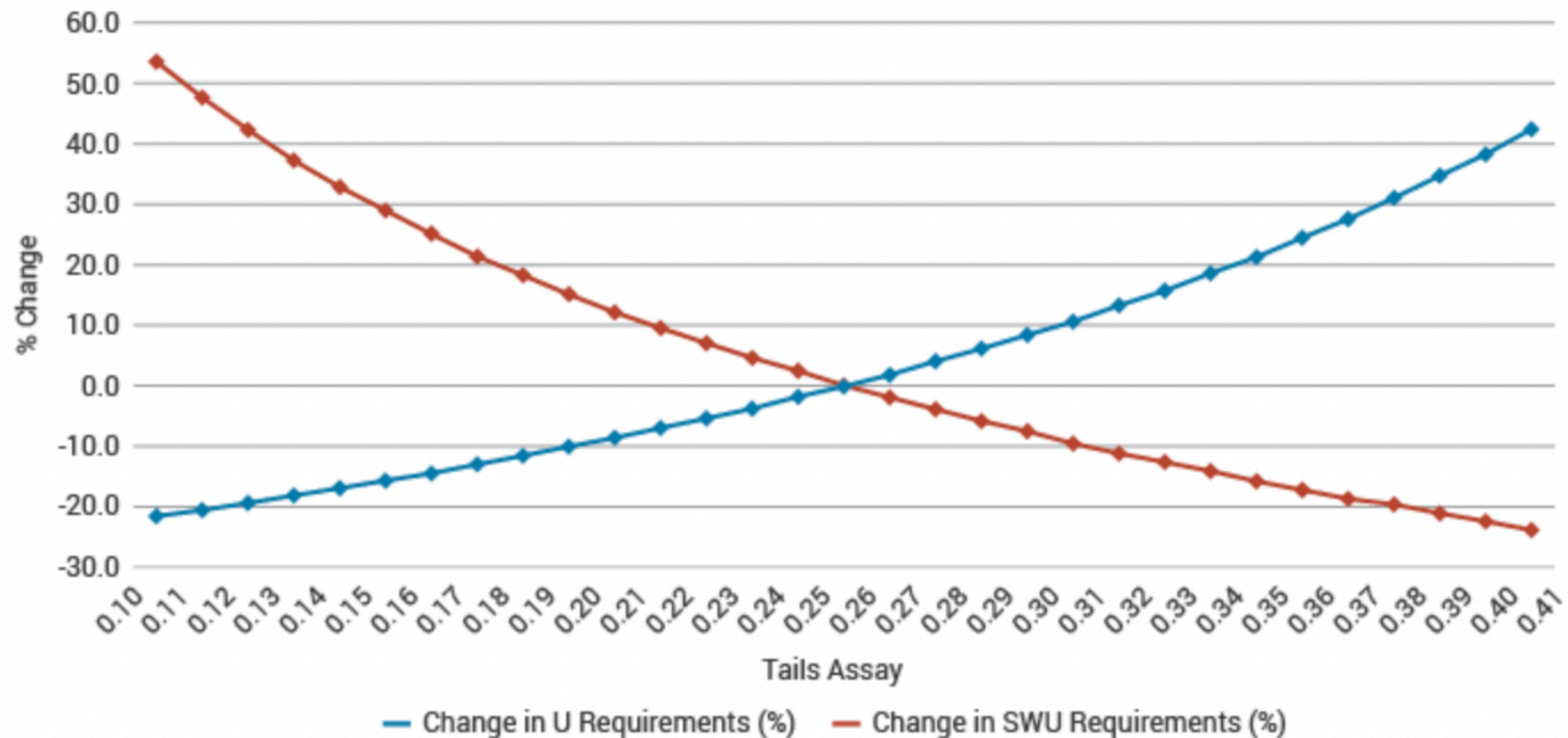
- ~70% of global nuclear demand in the OECD
- Russia controls ~40% of global enrichment and conversion
- Western utilities *not* entering into new contracts with Russia
- Western enrichment: underfeeding to overfeeding...



## Western Enrichment – Tails Assays on the Rise

- An increase in transactional tails from .20 to .30 = a >20% increase in uranium demand
- Western underfeeding → overfeeding = 35m lb.+ swing

Percentage Variation in Uranium Requirements and Energy Input to Enrichment with Different Tails Assay, from a Base of 0.22% U-235

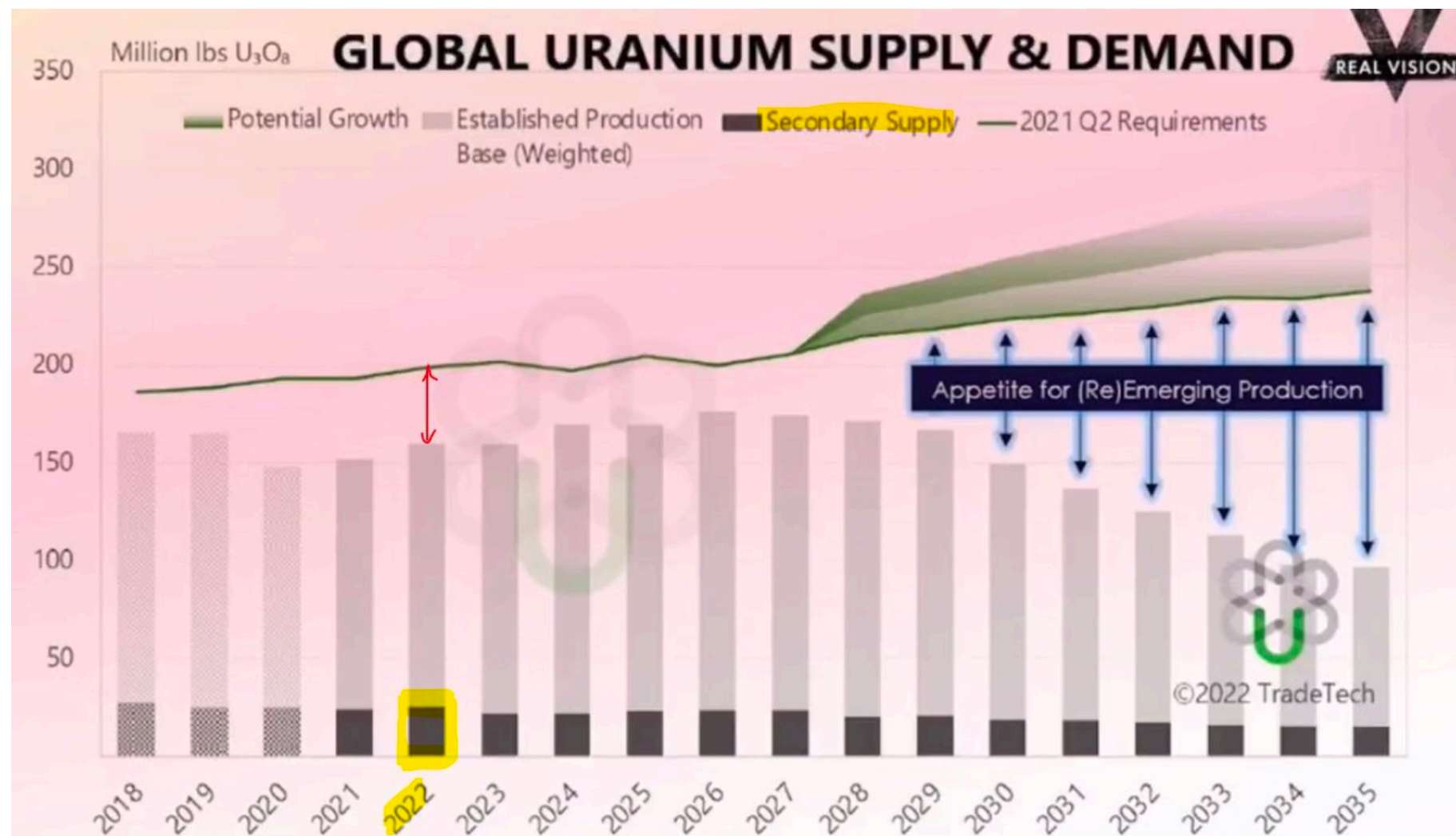


Credit: World Nuclear Association

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## Western Enrichment – Tails Assays on the Rise

- An increase in transactional tails from .20 to .30 = a >20% increase in uranium demand
- Western underfeeding → overfeeding = 35m lb.+ swing
- Secondary supply to the West effectively unavailable...we are in the early stages of a major shift from a buyers' market to a sellers' market



Credit: TradeTech; @quakes99



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## Investment Case – short/mid-term; long-term

- **Short/mid-term:** *VERY* thin spot market + SPUT = risk-on ‘squeeze’ highly likely within 12-18 months
- **Mid/long-term:**
  - Untenable supply deficit means a doubling of the current price is necessary to incentivize marginal cost projects
  - Nuclear “renaissance” and a push towards high EROI, “low-carbon” energy
  - The potential for a robust uranium supercycle – 2022 is YEAR ONE of a multi-year uranium contracting cycle

**Figure 8: Long-term contract volumes and term price**

