Hafnium – Where will it end?

Hafnium prices are at previously unheard-of levels, with public quotes (e.g. Argus, June 2026) crossing $14,000/kg.

Supply is exceptionally tight and end users are reportedly scrambling to find supply for the next 18 months or so. Some industry actors see prices moving higher and the days of sub-$1,000/kg hafnium are a long way away. Where, one might ask, are we headed?

OnG's opinion is that beyond the near-term pressure on supply, prices could come down over several years. But, absent major changes in consumption patterns, or a dramatic upsurge in nuclear power demand, we cannot see hafnium prices falling below somewhere in the upper-single-digit $ thousands per kg.

To explain our logic it's worth remembering why the world has access to hafnium in the first place, and what hafnium is used for today.

The world's nuclear industry relies on zirconium to fabricate nuclear fuel rods, which are typically about 98% zirconium. Zirconium is used in part because it is almost transparent to neutrons that cause fission and generate power in the reactor. Unfortunately, zirconium in nature is recovered from mineral sands and always comes with some hafnium (a good global average is 50 zirconium atoms per hafnium atom in these sands). And hafnium is as opaque to neutrons as zirconium is transparent and has to be separated chemically (from 2% down to below 100ppm), a technically challenging process. So, the rise of nuclear power in the 1950s gave birth to the hafnium industry.

Hafnium supply is easy to estimate from nuclear zirconium demand, because if the world recovers, say, 6,000-7,000 tons of nuclear grade zirconium, suppliers of nuclear grade zirconium must separate 120-140 tons of hafnium. This, OnG estimates, is roughly where hafnium availability sits today, although we have relatively low confidence in our assessment of how much hafnium China is actually producing.

There's more to hafnium than this, of course. Once a processor (the three Western World processors are ATI, Framatome and Westinghouse) separates hafnium from zirconium, they can then choose to remove residual zirconium from their now-separated hafnium. Over time, different markets have developed in part around the level of zirconium present in hafnium. Some space alloys, such as C103, are remarkably tolerant of zirconium in their hafnium (C103 can tolerate up to 7% zirconium), perhaps because these alloys emerged in the heyday of the space race when hafnium refining was less advanced than it is today.

Hafnium's main uses today are in superalloys (higher loadings typically in some land-based turbine alloys than in jet engines) and in electronics. For the former, 5,000ppm zirconium is a practical upper limit with 2,000ppm preferred, while for electronics it's a case of the lower, the better, and 100ppm zirconium is a common upper threshold.

Lesser uses include nuclear power (hafnium is used in some parts of reactor control rods), which is seeing growth as reactors are re-licensed, space and hypersonic alloys, where the story is mixed (SpaceX appears to have redesigned components to reduce exposure to hafnium), catalysts, specialty optics, and plasma cutting tips. These other uses collectively account for 15-20% of hafnium demand and growth in some segments is being offset by declines in others, thanks to the elevated price of hafnium.

Both superalloy and electronics demand are growing. Superalloy growth is being held back by supply chain problems in the superalloy industry and access to key materials (yttrium, essential in thermal barrier coatings, is an example). Growth is robust yet could be stronger if bottlenecks could be overcome and materials readily available).

Electronics, meanwhile, is quickly becoming the largest market for hafnium, thanks to the enormous boom in AI. The demand for AI chips and associated memory is accelerating the growth of production at the most advanced semiconductor nodes, which make greater use of hafnium that more mature nodes (hafnium is deposited as an oxide, often in combination with one or more of silicon, aluminium or zirconium). It is growth in electronics, together with strong demand in superalloys, that is tightening the hafnium market.

Trade frictions and Chinese dual use export controls play a part in the distribution of hafnium, but Chinese hafnium exports have not stopped, merely shifted from the USA to the EU (again, see Argus in June 2026). So China does not seem to be the cause of today's market tightness and price spiral.

In fact, in our view the heart of the matter is that growth in hafnium demand is outstripping growth in nuclear grade zirconium and has done so for some time. Eventually, in this framework, demand for hafnium has to run into the physical limit of zirconium dehafniation and OnG believes we are probably close to this limit now. Solar grade polysilicon went through the same transition around 2008 albeit without the same remarkable impact on price.

This leads to the inevitable conclusion that in the future and perhaps soon, absent a major correction to hafnium demand, processors will have to dehafniate zirconium solely to supply hafnium, stockpiling the zirconium (likely as an oxide) for another day.

There are other avenues, for instance using ores that have a much higher hafnium to zirconium ratio (we know of just a handful of prospects), or improving recycling of hafnium (although this is technically difficult and likely not practical for much electronics and some superalloy demand). We see the escape routes as low probability and think the path of deliberate dehafniation is the road we will take.

This is why we see hafnium's price remaining elevated. Processing hafnium and zirconium is not cheap and while each hafnium refiner will have different economics, we believe deliberate dehafniation will require a price comfortably above $5,000/kg.

And as unwelcome as a sustained price of this level will be to consumers, the good news is that (as best we can judge from our inexpert read of available permits) there is plenty of headroom between ATI, Framatome and Westinghouse to continue expanding supply for a decade or more, at a pace that can support current demand growth rates.

For hafnium, the real issue is not price but availability. Provided consumers are willing to pay the costs of deliberate hafnium recovery, the atoms will be there.

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