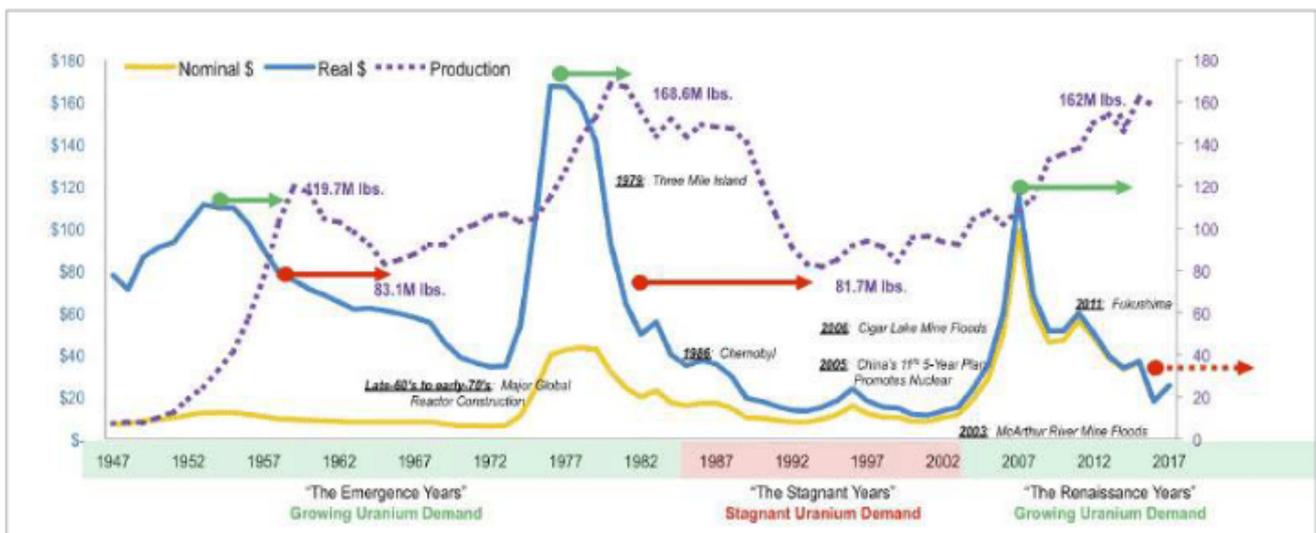


Is the Uranium sector about to come back to life?

Nuclear Power is currently a much needed source of global base load power. After the Fukushima disaster in 2011 the industry has had a severe slowdown; however signs of life are emerging as the world moves to a safer nuclear solution. The uranium metal price is accordingly showing some early signs of recovery. The chart below gives a great long term perspective, also showing uranium prices are still near historic lows.



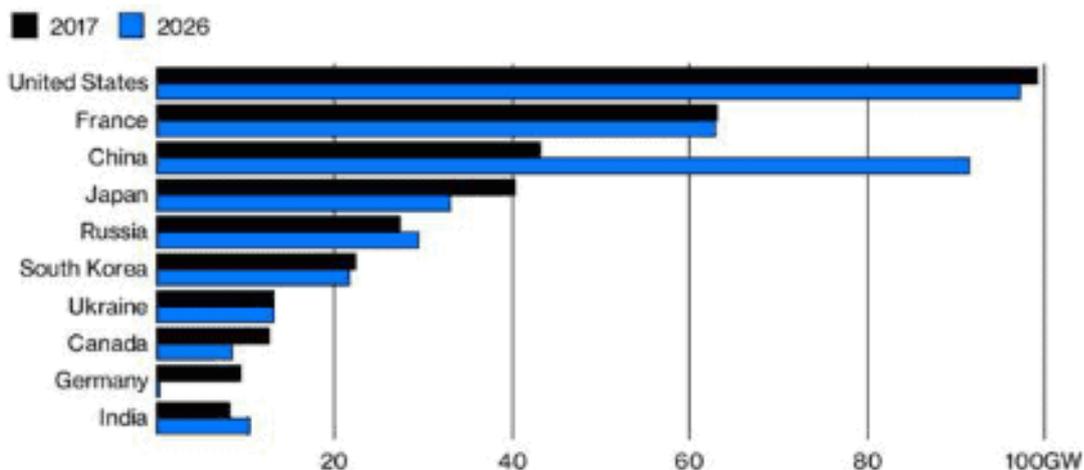
Uranium price and production graph 1947 to 2018

Global nuclear demand and supply forecasts

Currently in more than 12 countries, 71 nuclear reactors are under construction, 165 are planned, and 315 are proposed. China plans to spend \$2.4 trillion to expand its nuclear power generation by 6,600%. Demand side growth in new nuclear reactors continue to grow with 'first fills' for new reactors requiring three times the uranium up front as annual burn. Japan is restarting idled capacity, and the primary producers are cutting back on production. The graph below shows the large increase in nuclear power plants that are expected to come from China.

Go Nuclear

China on path to challenge U.S. as home of atomic power



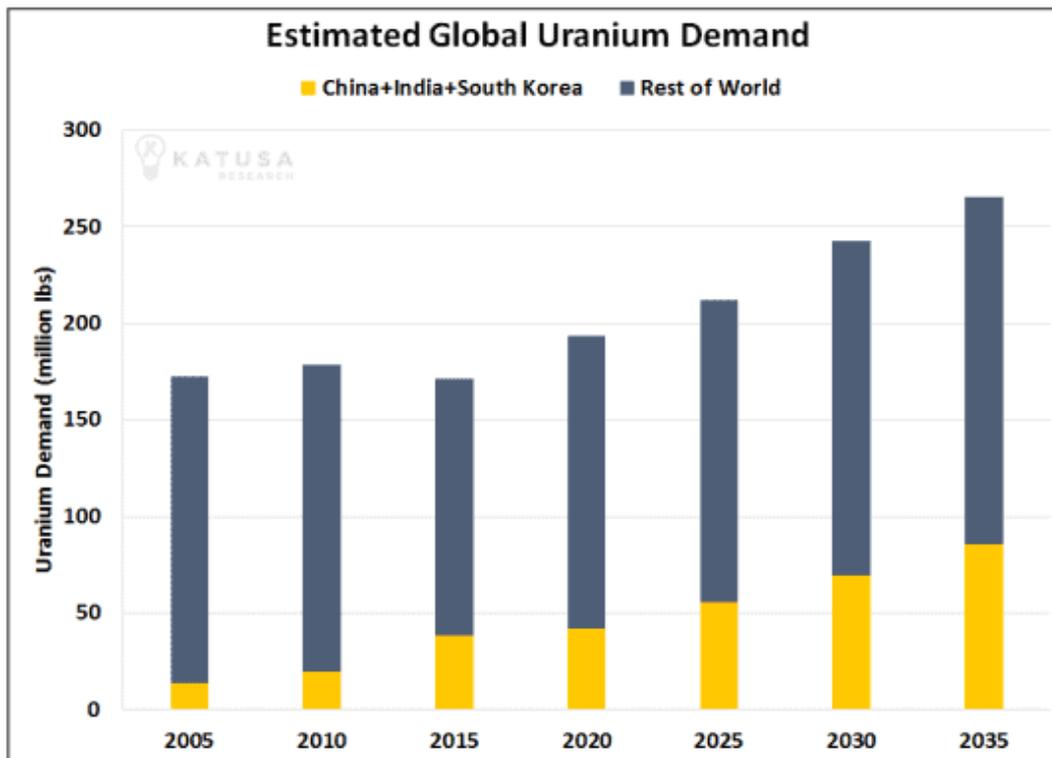
Data: BMI Research; graphic by Bloomberg Businessweek

Nuclear forecast growth 2017 to 2026

World Nuclear.org quotes the International Energy Agency (IEA) 2017 report which states: "In the Sustainable Development Scenario, low-carbon sources double their share in the energy mix to 40% in 2040, all avenues to improve efficiency are pursued, coal demand goes into an immediate decline and oil consumption peaks soon thereafter. Power generation is all but decarbonised, relying by 2040 on generation from renewables (over 60%), nuclear power (15%) as well as a contribution from carbon capture and storage (6%) – a technology that plays an equally significant role in cutting emissions from the industry sector." Nuclear is currently about 11% of electricity supply. "The IEA's 'New Policies Scenario' sees installed nuclear capacity growth of over 25% from 2015 (about 404 GWe) to 2040 (about 516 GWe). "

Global uranium demand

Morning Star expects global uranium demand to rise roughly 40% by 2025. They forecast that low secondary supplies will cause shortfalls and that this will affect price negotiations by 2019. To encourage new supply, expected price should rise to around \$65 per pound. Marin Katusa's research, shown below, forecasts a steady increase in global uranium demand, mostly due to China, India and South Korea.



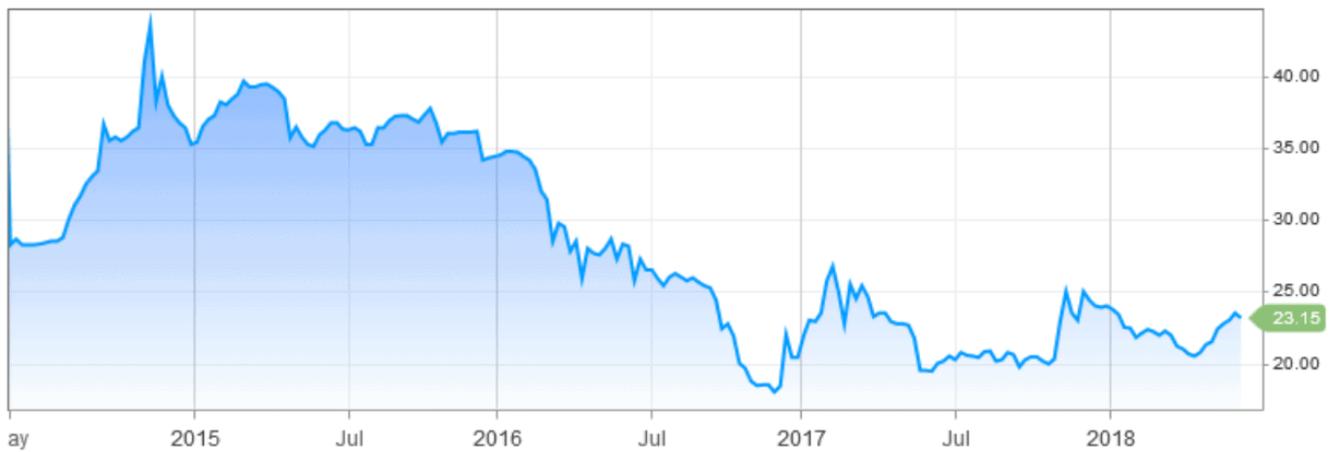
Katusa Research: Estimated global uranium demand.

Global uranium supply

In 2017, Cameco and Kazatomprom announced production cuts in an attempt to reverse the past oversupply problem. This is starting to have an impact on the market now.

According to the uranium report 2018 by Swiss Resource Capital AG: "Today only 90% of the global uranium demand can be satisfied by producing mines."

As the uranium price starts to rise this confirms the above research thesis. That is, rising demand and falling supply is resulting in an increasing uranium spot price.



CNBC: Uranium 5 year spot price graph

The recent upturn in uranium prices has many analysts and industry experts asking the question: “Is the Uranium sector about to come back to life?” An increasing group is beginning to build a strong case for a uranium price recovery, especially when given most uranium producers struggle to be profitable at today’s low uranium prices.

It appears to me that if demand continues to grow strongly then we may well be witnessing a recovery in the uranium sector after a nasty bear market since 2008. Politics will no doubt play a crucial role, as the various Governments decide if nuclear is appropriate for their country. Investors would be wise to take an interest now, as legendary mining investor Rick Rule said: “Bear Markets are the authors of Bull Markets.”

Post Nuclear Germany – a Green Myth?

In the wake of the Fukushima nuclear disaster in Japan, Angela Merkel managed to transition from being a Centre Right

politician loathed by the European Left to being a darling of the Green Movement. The deed that achieved this transformation in sentiment was the precipitate announcement that Germany would phase out all its nuclear power plant fleet by 2022. It would be replaced by alternative energy sources such as solar, wind and tidal power, combined with energy consumption savings, under an initiative known as the *Energiewende*, or energy transformation. This sudden decision to phase out the nuclear plants also involved adherence to the pre-existing goal of reducing national CO2 emissions to 4% below 1990 levels by 2020, and by 80-90% by 2050. Easily said by a politician who won't be around in 2050 to face the music on non-compliance!



All this sounds like, as they would say in the US, a “mom and apple pie” issue. Who wants to complain about all this good stuff going on? Well, the slight wrinkle in this plan is that to achieve this Quixotic goal, Germany is now burning more lignite coal than before Merkel made her shock announcement. Yes, in the age of reducing carbon emissions and after the acid rain scares of the 1980s (largely created by East German lignite being burned by power-generators) we now have Germany pumping out more of this stuff to reduce its dependence on nuclear.

While those of Green sympathies in Germany may be cognizant (and acquiescent) of this fact, more of the environmentally-aware in other places are environmentally-unaware that the price they pay for less of the clean energy of nuclear is more of the same old, same old carbon pollution that the EU has been hot and heavy for decades against.

In any case, the potential removal of German demand from the Uranium market has been one of the things weighing upon the price of the metal. The return to production of Japanese generators has helped change the mood for the better, but

Germany is still a key part of demand and so I shall look here at how this situation evolved and how Germany's renunciation of nuclear is a blow for clean-tech.

The German Nuclear Scene

In her first flurry of panic, Angela Merkel shuttered eight reactors, reducing the country's capacity to nine reactors with 12,003 MWe capacity, and then to eight reactors with 10,728 MWe. The country's 17 nuclear power reactors, comprising 15% of installed capacity, formerly supplied more than one quarter of the electricity (133 billion kWh net in 2010). Many of the units are large (they total 20,339 MWe), and the last came into commercial operation in 1989. Six units are boiling water reactors (BWR), 11 are pressurised water reactors (PWR).

According to the Fraunhofer Institute, German generating capacity in April 2014 was 169.6 GWe comprising:

- 1 GWe nuclear
- 6 GWe hydro
- 7 GWe wind (0.6 offshore)
- 9 GWe solar, 28.2 GWe gas
- 2 GWe lignite
- 3 GWe hard coal
- 6 GWe biomass



In the first half of 2014 wind and solar PV had capacity factors of 18% and 11% respectively, compared with 85% for nuclear. In 2011 Russia provided almost 40% of the natural gas, followed by Norway, Netherlands and UK, while only 14% was produced domestically.

Some outside Germany perceive that the actions were taken due to some legacy issue with Soviet-era facilities, but when Germany was reunited in 1990, all the Soviet-designed reactors

in the East were shut down for safety reasons and are being decommissioned.

The Coal Splurge

Lignite is the cheapest source of electricity from fossil fuels, and Germany has the world's largest reserves of it. But lignite causes the highest CO₂ emissions per ton when burned, one-third more than hard coal and three times as much as natural gas. The three German coal-fired power plants are among the largest point-sources of CO₂ emissions in the world.

Germany's CO₂ emissions have started to show a retrograde trend:

- 1,051m metric tons in 1990
- 813m tons in 2011
- 841 m tons in 2012 and 2013

As a result, Germany could very well fall short of its 2020 CO₂ target by five to eight percentage points.

Perversely for industrial users, Germany has become a source of cheap electricity, but not for private consumers in Germany, who have had to foot the bill for the renewable power sources putsch, as a result of German feed-in tariffs.

In 2014, the German government parties passed the Climate Action Program 2020, a rather idealistic strategy to reduce emissions by around 70m tons annually by 2020, in light of the fact that they are increasing, rather than decreasing the burning of coal! The hefty cost of this policy: US\$2.2bn to \$3.3bn per year, will be divided half and half between the federal government and private consumers who have to pay more for their electricity.

The overall share of coal in German electricity production has shrunk from 56% in 1990 to 43% in 2014. During the same period, the share of renewables in electricity production has

risen from 4% to 26%.

Conclusion

It is ironic that Germany comes across to the outside world as one of the most “green-conscious” nations in Europe, if not the world, but few seem to have realized that its precipitate disavowal of nuclear energy has plunged many neighbouring countries into a zone of heavier carbon emissions than would otherwise be the case, while making a mockery of global warming and lower emissions concerns.

While Germany continues to expand solar and wind power, the government’s decision to phase out nuclear energy means it must now rely heavily on the dirtiest form of coal, lignite, to generate electricity. The result is that after two decades of progress, the country’s CO₂ emissions are rising. The Merkel administration seems to have been given a “free-pass” by the environmentalists because the *quid pro quo* for this move has been the eventual removal of nuclear power from the country. This is a Faustian bargain indeed.

With Japan reopening its nuclear plants and most other nations unfazed by nuclear power, Germany is the odd man out in eschewing an energy source that is carbon-neutral. There are limits to how much solar or wind power that can be installed and some nations are starting to run into the buffers, particularly with regards to offshore wind farms.

The remarkable consensus from both sides of the German political fence towards the self-defeating retreat from nuclear energy, makes most think that the 2022 shutdown is inevitable. Frankly the pressure should be coming from EU partners baulking at the emissions raining down on them. That, plus a failure of alternative energy sources to reach the sufficient level of participation to replace nuclear, might just prompt a rethink. The share that coal possesses even now is massive compared to that of nuclear. Remove the nuclear and

do not reduce the coal-fired and you have actually seen a deterioration of the share from clean-tech.