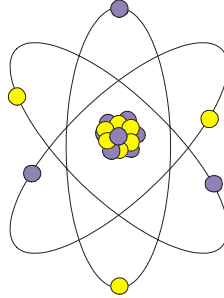


# Nuclear: An Odd Business?

*Steve Kidd*



Uranium gets special treatment from the media and inspires special concern among the public, but it is a commercial commodity no more quirky than any other.

When giving presentations on nuclear power to outside audiences, I always try to remove some of the emotion that surrounds the business by attempting to demonstrate that it isn't fundamentally "special" and shares many common features with other sectors, particularly the other energy sources.

As a case in point, uranium has always been regarded as a rather special commodity. Seen as a key strategic material for military reasons and for energy independence, there has been a large amount of government involvement in its production, trade and use. My contention, however, is that uranium is just another metal commodity, all of which have some special features but also much in common in terms of markets, investor interest and pricing. Uranium's price history is certainly peculiar (with prices lying at a depressed level for many years), but can be explained by special factors, notably the abundance of various secondary supplies. On the question of sustainability of resources, I would argue that uranium is no different from other commodities whose measured reserves are continuously replenished by changing market prices, providing incentives to new exploration (and eventually new discoveries and later production too).

My contention is then that much of the additional attention that is given to uranium and nuclear is therefore quite illogical and unwarranted, imposing substantial costs on the industry, which have to be recovered from customers (effectively all the buyers of electricity). We should therefore try to overcome this as much as it is possible to do so.

But am I being over-idealistic? Should we just not accept today's critical world, which seems to regard nuclear as so very special? Am I wasting my time in trying to change this perception? Perhaps it's a difficult task, but what are the notable features of the nuclear fuel cycle and how special are they?

For one thing, compared with other energy sectors such as oil, coal and gas, the nuclear fuel cycle itself is rather complex. The intermediate stages of conversion, enrichment and fuel fabrication are services provided by specialist companies, while there are important and valuable possibilities for the recycling of materials. The other energy sectors are, by comparison, quite simple in structure. Oil refining, where the barrel of crude oil is split into various products, is a complex process, but not on the same scale as nuclear.

Compared with the other fuels consumed in generating electricity, the fuel cost in nuclear power is relatively minor compared to total nuclear costs. This remains true even when conversion,

enrichment and fuel fabrication costs are added to that of uranium, together with an appropriate allowance for the cost of spent fuel management and final waste disposal. Total fuel costs of nuclear are usually under 20% of the total, compared with up to 80% in fossil fuel plants.

Another complexity is that the contractual arrangements normally used within the nuclear fuel market are a peculiarity when compared with trading in other energy commodities. In general, electricity utilities or their procurement agencies contract directly with uranium mining companies for the supply of uranium concentrates. Their uranium is then processed into a useable form through agreements with fuel cycle service providers. Secondary markets for uranium, conversion and enrichment services have also developed and the arrival of ex-military fissile material on the market has added to this.

There is also only a relatively loose short-term quantitative relationship between the annual consumption of nuclear fuel in reactors and the utilities' annual demand on uranium producers. This relationship is complex and is the subject of much analysis and is not generally replicated in other commodities, where production cycles are not so long or inventories so important.

Trading in uranium is also distinctive. Most uranium continues to be sold on the basis of multi-annual contracts, based on perceived utility requirements. The spot market in uranium is driven by shorter-term adjustments to utility procurements and by uranium production plans rather than annual reactor requirements. The spot market mainly exists through various traders and brokers. Unlike for many other commodities, there is no terminal clearing market place such as the London Metal Exchange or its equivalents.

Historical uranium production remains highly relevant to the market today. Any nuclear material still containing fissile isotopes can potentially be processed for re-entry into the nuclear fuel cycle. This material may be in the form of depleted uranium from enrichment, reprocessed material from spent nuclear fuel, unprocessed spent fuel, or fissile material of military origin. The economics and frequently also the politics of recycling are the

limiting factors. Cumulative uranium production throughout the nuclear era, in the half century since 1945, therefore retains great importance. But in this respect, the market bears some basic similarities to those of precious commodities such as gold.

There are significant political pressures to reduce the large quantities of surplus ex-military highly enriched uranium (HEU) and military plutonium by using them as fuel within civil nuclear power reactors. In fact, such use of HEU presents few technical difficulties and has already become a major source of supply. This will continue through 2013 and may possibly be extended thereafter. The use of ex-military plutonium in civil reactors, replacing relatively small amounts of fresh uranium, is also now beginning.

Another important feature of the nuclear fuel cycle is its international dimension. Uranium is relatively abundant throughout the earth's crust, but distinct trade specialisation has occurred, due partly to the low volumes required and therefore the low costs of transportation. For example, uranium mined in Australia can be converted in Canada, enriched in the United Kingdom, then fabricated as fuel in Sweden for a German reactor. Recycled reactor fuel may follow similar international routes, with their related political as well as economic implications. This international dimension, and the existence of large inventories, has also led to the development of an exchanges (swaps), loans and borrowings segment within the nuclear fuel market. On the other hand, there are also trade restrictions which influence the market.

These features above are definitely rather distinctive, but are surely not sufficient to justify the web of licensing, surveillance and national and multinational regulations that are in place throughout the fuel cycle. Added to these impositions, political influence on the nuclear fuel market has also always been a significant factor, with decisions taken to build new reactors, or to allow new fuel cycle facility construction or trade in materials to take place, often containing significant non-economic dimensions.

There must certainly be something else that is driving all the attention given to nuclear. The answer undoubtedly lies in the general fear of radiation and also of nuclear weapons proliferation. This is where the nuclear business is more rationally regarded as rather special and where it is hard to overcome the demands for very special attention. To ensure that safety and non-proliferation objectives are met, a mountain of rules and regulations are administered by governments, regional organisations, such as Euratom in the EU, and by the International Atomic Energy Agency.

The industry can point to its superb record on plant safety (certainly by comparison with the other energy sectors). Weapons proliferation has recently become a bigger issue again, with the concerns over North Korea, Iran and other states, but the Treaty on the Non-Proliferation of Nuclear Weapons has undoubtedly been a big success to date – the expectation that many nations would have ‘gone nuclear’ by now has not been fulfilled.

The difficulty is in analysing how much of these successes have been due to the close attention of the authorities and how much would have happened anyway, without the heavy costs imposed on the industry in compliance. This is very relevant in the USA today, where the industry is putting in a significant effort to streamline the process of getting new reactors built. Heavy-handed regulation is certainly not appropriate, but the public has the reasonable expectation that the industry will be policed in a way that ensures safety and security goals.

Obviously there is a fine balance to be established here. Getting the favourable messages on industry performance over to both the authorities and the general public is challenging. In particular, the more irrational fears of radiation and the barriers between the civil and military sides of nuclear are hard to explain. Yet the industry and its supporters must never give up here. To expect perceptions and decisions to be wholly rational of course flies in the face of everyone’s experience of life, but the facts should be stated calmly and precisely. Attempting to show that the nuclear business is not so odd should form part of this, but we need also not be so defensive about the usual

negatives picked on by our opponents. For example, demonstrating the idea that used nuclear fuel is an asset to the industry rather than the industry’s Achilles heel may fly in the face of usual public perceptions. Yet it is a reasonable argument to use now – more aggressively promoting it may eventually begin to resonate with key audiences.

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