

Developments in the US and European LWR Fabrication Markets: a 1998 Update

Charles K Anderson

At the Twenty-First Annual Symposium of the Uranium Institute, in September 1996, I presented a paper¹ which concluded that the large differences in fabrication prices between Europe and the United States at that time would have significant implications for the development of the fabrication market in both regions. Since that report, the market has developed exactly as predicted and considerably faster than expected.

In Europe, prices have fallen in dollar terms by more than 40%. Some of this is the effect of exchange rate changes since the last report, but the biggest factor is increased competition for the limited demand. This is clear from the progressively lower prices offered in each successive round of competition.

These significantly lower price levels will force US and European fuel vendors to adjust internal cost structures as much as possible, and it may lead them to seek ways of optimising the use of existing industrial capabilities. This report addresses these factors and projects how the fabrication markets might adjust over the next several years. It presents my personal views, independent of any market participant, based on CKA Associates' knowledge of these markets.

The US LWR Fabrication Market Update

Figures 1 and 2 update the committed and uncommitted requirements in the US PWR and BWR fabrication markets through 2007. During this period, US PWR requirements total about 13 860 tHM, of which about 5000 tHM (35%) is uncommitted. US BWR requirements through 2007

total about 6440 tHM, of which about 3200 tHM (50%) is uncommitted. The data reflect only firm commitments between US utilities and BWR fabricators. Options are considered to be uncommitted.

Over the past two years, the US market has changed in several important ways. First, the ten year cumulative demand is down about 1000 tHM due, primarily, to reactor delays and cancellations. While this is relatively minor overall (<5%), most of the loss is skewed to the early years.

Another important factor since the last report has been the large amount of contract commitments made in the PWR segment. Westinghouse, ABB Combustion Engineering (ABB-CE) and, to a lesser extent, Framatome Cogema Fuels (FCF) have all been successful in renegotiating long term commitments with their current customers. I estimate that this has removed more than 3000 tHM from the available market over the ten year horizon.

The available PWR market in the US is now only about 33% of requirements over this timeframe, and does not re-emerge until 2002–03 in any significant amount. This is the smallest uncommitted market horizon in many years. The available PWR market for delivery in the next three years is essentially zero and less than 600 tHM are uncovered over the next five years. So, it will be difficult for under-sold PWR vendors to pick up near term load in the United States.

The BWR market, on the other hand, remains relatively open to competition. About 45% of this market is available and it emerges somewhat sooner (~2000). This will create some opportunities for

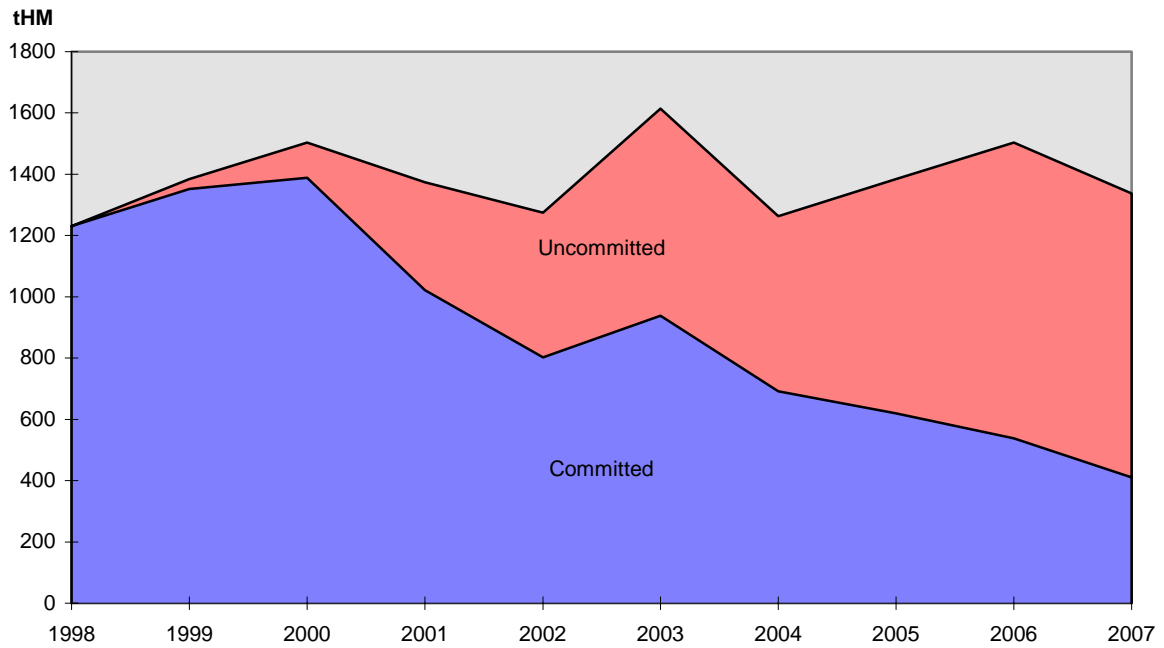


Figure 1. Committed and uncommitted PWR fuel fabrication requirements in the US market to 2007 (tonnes HM).

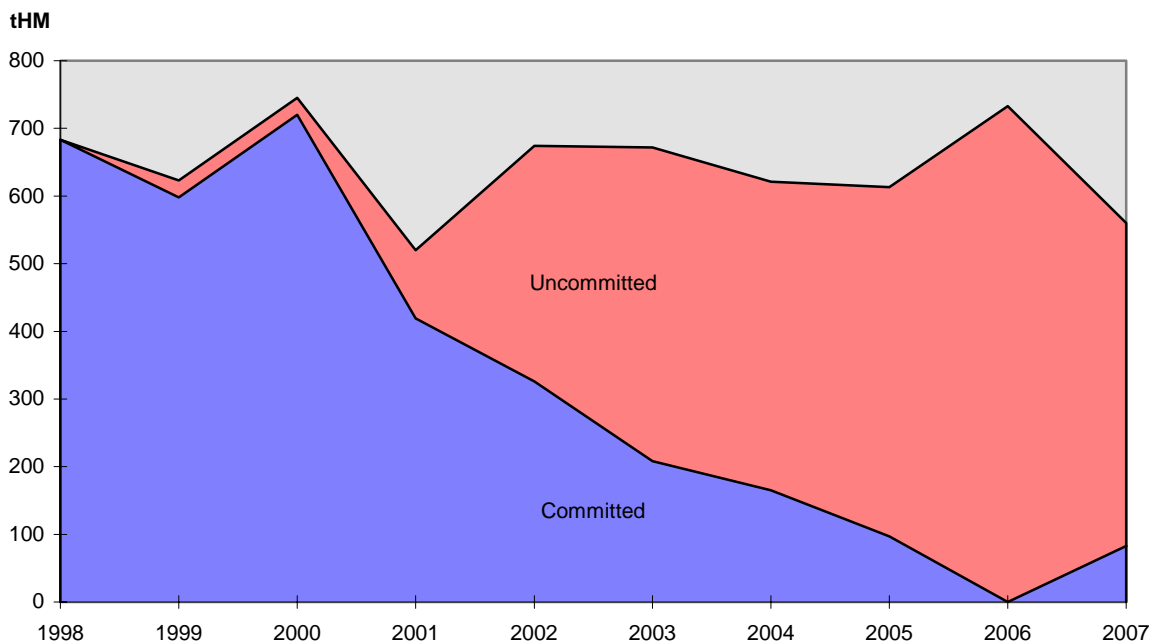


Figure 2. Committed and uncommitted BWR fuel fabrication requirements in the US market to 2007 (tonnes HM).

BWR suppliers within the planning horizon.

In the various US PWR market segments, the dominance of the original reactor suppliers was further established during the past two years. FCF is now thought to have commitments for 71% of the B&W 15x15 segment over the next ten years, with no serious competitor for the balance. Similarly, ABB-CE has retained virtually all business in the CE 16x16 segment (~89%).

In the important 17x17 market segment, Westinghouse has added about 1400 tHM to its order book over the last two years. This success has removed a huge portion of uncommitted PWR fuel from the market, which could adversely affect other PWR suppliers' future strategies and plans. Most of this business (over 80%) was obtained by re-negotiation or extensions of existing contracts. Only a small amount was new business.

In the US BWR market segment, on the other hand, strong competition still prevails with ABB-CE and Siemens making small gains in market share at the expense of General Electric (GE).

Update of US Fabrication Price Trends

CKA Associates maintains a database of more than 100 price data points. These data are derived from public and private sources and are maintained in confidence. We report only composite results by category (e.g. fuel type, time periods, contracting form, etc.).

Also, since we cannot discuss absolute prices in this forum, we will refer, as before, to relative fabrication prices (RFP) throughout this discussion. In order to best illustrate recent trends, we will continue to define the 1995 average price for all US PWR fuel types, based on the CKA Associates database, as the reference point (i.e. RFP 1).

All recent price data have been deflated to 1995 US dollar values using the historic GNP deflator applied to the direct source prices. This corrects for the time related value of the US dollar and preserves the relative significance of these new data. (The effect has been modest over the past two years.) All prices have been adjusted to include a comparable scope of supply.

There are many ways to report prices, and there can be a wide range of useful considerations, as discussed below.

Fuel Type

Prices can vary by fuel type and by the level of competition within a fuel type segment. Over the last two years, the 17x17 fuel type has retained its position as the lowest priced fuel segment at about RFP 0.96 (i.e. 4% lower than the overall US PWR average). Three strong competitors vying for each new opportunity are maintaining the low prices in this segment.

Other PWR segments, served by only one or two vendors, exhibit higher prices on average, but the premium has dropped substantially relative to the overall average. Most of these segments are now within 1-2% of the average (\leq RFP 1.02), down from about 10% above average two years ago. This is a consequence of favourable prices negotiated in exchange for long term contract commitments.

The BWR segment, which has been dominated by one supplier, historically had prices which averaged nearly 70% higher than PWRs (RFP 1.68). Today, this has been reduced under competition to about 50% (RFP 1.51); and will come down further in the near future as new contracts taken at

RFP 1.20 to 1.25 begin to become effective.

Contract Age

Regardless of fuel type, there is a clear downward trend in prices over time. The progressive decline in US PWR prices began around 1987. Average prices fell more or less uniformly at a rate of about 2% per year through 1993. Then, starting in 1994, intense competition induced a further significant drop of about 10%. Over the last two years the average PWR price declined only 2% (i.e. 1% per year), indicating a levelling of the prices in these segments.

As indicated above, the US BWR fabrication market in the mid 1980s was especially uncompetitive, with only GE and Siemens present in the market. But the entry of ABB-CE into the US BWR market created a greater level of competition for market share in this segment. The average BWR fabrication price dropped accordingly. Current BWR contract prices in the USA are around RFP 1.50, with new competitive bid prices as low as RFP 1.20.

Competitive Bid Versus Negotiation

Historically, fabrication services procured through contract re-negotiation with the existing supplier have relatively high prices: RFP 1.35 for PWRs and RFP 1.70 for BWRs. In the past, the best prices were clearly obtained via open competition. Today, however, fabrication services procured through contract re-negotiation with the existing supplier can be obtained at competitive prices. The incentive to re-negotiate and extend existing contracts at prevailing market prices is motivated more by the vendors' desire to avoid the uncertainties associated with competitive procurement campaigns and to "lock-in" business as a more firm basis for cost planning and investment.

During the past two years much of the US PWR market has been committed by re-negotiation. Only the St Lucie-1 and -2 and Turkey Point-3 and -4 contracts, to ABB-CE and Westinghouse respectively, were awarded on the basis of competitive bids during this timeframe. Based on this limited evidence, competitively bid PWR contracts are still at price levels about 5-7% lower than negotiated contracts. Nevertheless, in many cases there are extenuating circumstances which justify the negotiated approach, and vendors are offering competitive prices to achieve that.

Long Term Versus Short Term

The same is true of contract duration. Long term contracts in the past tended to evolve into high

prices over time due to unfavourable escalation terms and the inability to obtain new design improvements at reasonable prices. Today, new contracts are being developed with better terms concerning forward price protections while still offering competitive current prices. In several recent competitions, long term contracts contained better base prices than shorter term contracts.

Price Bottom

Prices cannot decline forever. By our estimates, the lowest of today's competitive prices are approaching some vendors' average production cost. As these newer contracts begin to dominate production, some suppliers will struggle to make money on base contracts. Because of this, a further price decline is not expected. On the other hand, the excess fabrication capacity and competition among the fabricators to maintain their market share will continue to constrain future price increases.

Thus, for the next two or three years, average US PWR prices are expected to remain at current levels. As stated above, BWR prices will decline as new contracts take effect. In the longer term, prices could begin to increase somewhat, to an extent determined by international markets and by global industry restructuring.

Update of European Fabrication Price Trends

Since the last report, there have been seven new BWR and four new PWR data points in the European fabrication market (excluding the new base contract between Electricité de France and Framatome).

In 1996, the best European PWR prices were 60–70% higher than in the USA (RFP 1.65). European BWR prices were about 100% higher than in the USA (RFP 2.16). Over the past two years, in dollar terms, European PWR prices for new contracts have dropped nearly 35% and European BWR prices are about 40–50% lower. Some recently quoted prices are even lower.

Exchange rate considerations are an unavoidable complication in making international price comparisons. But if we take the 1996 prices and adjust only for exchange rate changes since then, prices would be only about 15% lower in dollar terms. In real terms, therefore, European prices have dropped about 25% over the past two years.

Today the disparity between US and European prices has closed to within 20–25%. While prices in Europe are still not as low as in the USA, a direct threat from US suppliers entering the European market is now less likely.

But certain European vendors did not fare well in the developments over the past two years, and suffered loss of load that will begin to affect their shop utilisation within the next two years. These companies may need to take business from other competitors to maintain viable loads. To do this, they will have to decrease prices and accept the new market realities. The likely result is further pressure on average European fuel prices. Therefore, we expect European prices, in dollar terms, to fall another 5–10% in the future, not counting exchange rate effects.

It should be noted that there are still unique national differences which justify some price dichotomy throughout Europe. These include:

- support for domestic suppliers,
- the implications of using MOX fuel,
- the desire of utilities using reprocessing to avoid US components.

For these reasons, there is greater variation around the price averages in Europe than in the USA.

Industry Restructuring

Companies are in business to make money and, if prices are falling, costs must adjust accordingly. The major factors which affect vendors' costs, in descending order of importance, are as follows:

- Shop utilisation (fraction of rated capacity actually used for production).
 - Vertical integration (fraction of work performed within the company).
 - Accounting principles and corporate philosophies.
 - Economies of scale (total amount produced).
 - Unit cost of goods, services and labour.
 - Design features and manufacturing processes.
- A full discussion of these issues is beyond the scope of this paper but can be found in Reference 2. However, declining prices will compel all vendors to develop effective long term solutions which achieve improved shop utilisation and economies of scale, and, in some limited areas, vertical integration.

As mentioned above, there is considerably less incentive than two years ago for US companies to seek direct access to the European market. A weakening of the US dollar could alter this conclusion, but for now the remaining difference between US and European fabrication prices has narrowed to the point of regional issues.

On the other hand, because of the short contract cycle times in Europe, the European market still offers near term sales opportunities that do not exist in the USA. For vendors in need of near term load, this market is therefore hard to ignore. This

implies greater inter-vendor co-operation, from component sub-contracting to full mergers, including acquisitions and joint ventures, to consolidate the limited demand into fewer production facilities.

Restructuring Trends

The simple fact is that the world supply capacity for fuel fabrication is a factor of two more than demand, with no near term prospect of this changing through closures. When prices were high, this situation could be sustained. But with new market pressures to reduce prices, not just in the fabrication business but for nuclear power overall, a new industrial structure is expected to emerge. Fortunately this can take place in a manner which preserves competition, while producing efficiencies.

The new structure would achieve maximum use of the most efficient of the existing manufacturing facilities. Combined with some efficiency improvements in other manufacturing areas, this would offer the greatest potential to reduce costs, allowing companies to compete better and produce profits.

Sub-contracting of fuel assembly components between suppliers is one way to improve both utilisation and economies of scale without changing the basic industrial structure. This approach is already being taken in a few cases. But, in the end, only a correction of the global supply/demand imbalance will satisfy the conflicting requirements for low costs and adequate financial returns. This suggests closure of smaller facilities and greater cross-supply.

The first step is likely to be the elimination of small "blocks" of capacity within a supplier's system, where they exist. Framagma's recently announced closure of one of its facilities at Pierrelatte is an example of this retrenchment, consistent with reduced demand and lower market prices. BNFL and Siemens have also retired facilities and consolidated production in recent years. This is one trend we see in Europe: partial retirement of capacity, to more closely follow demand.

This will be followed, reluctantly but inevitably, by cross-vendor co-operation and consolidation of overall capacity (it is more beneficial to close whole facilities than to gradually wind down operations). Smaller or antiquated facilities which are, or which become, part of a bigger supply capacity are vulnerable to closure.

The extent to which competitors may collaborate is, of course, limited by applicable anti-trust laws.

Moreover, US, European Union and other governmental authorities apply relevant anti-trust laws in deciding whether to approve proposed mergers, acquisitions and joint ventures.

One of the most significant near term consolidation possibilities relates to Westinghouse, its various international licensees and partners, and new owner BNFL. Considerable excess capacity exists between these various entities and a post-acquisition strategy must, at least, take this into account. Similarly, General Electric, with its various international licensees and partners, offers great potential for more efficient utilisation of various facilities. Another interesting possibility could be an expansion of the various co-operative ventures that Siemens has undertaken previously with Framatome and Framagma.

In short, we see a number of major re-alignment possibilities in the fabrication industry, with closure and consolidation of facilities as the economic driver. Furthermore, the complete exit from the market of one or more suppliers, perhaps through a corporate level merger, can no longer be ruled out.

Summary

US prices for fuel fabrication appear to be stabilising, albeit at considerably lower levels than those which prevailed 5–10 years ago.

In Europe, the price for fuel fabrication services, in dollar terms, has fallen by more than 40% overall. Due to further direct competition within Europe, we expect European prices to fall another 5–10% before stabilising. About 15% of this reduction is the effect of exchange rate changes, but the balance represents a real decline in vendor revenues.

The near term challenge will be for vendors to profit at these lower price levels. Successful vendors will first optimise internal structure and costs, followed by consideration of co-operative ways of maximising industrial capabilities to provide fuel, or components, at the level of cost required in the new market.

References

1. Anderson CK, *Projected Developments in the US and European LWR Fabrication Market*. Uranium and Nuclear Energy 1996, Proceedings of the Twenty-First Annual Symposium of the Uranium Institute, London, September 1996.
2. Anderson CK, *Projected Developments In The US LWR Fabrication Market*. Presented at the NEI International Uranium Fuel Seminar, St Petersburg, Florida, October 1996.