

Nuclear myths – is the industry also guilty?

The nuclear industry often suggests that the development of new nuclear power stations is being held back by financial barriers and appears to be pinning its hopes on small reactors, climate change reform and construction in the developing world. But are these messages based on fact or fiction?

The nuclear industry complains that its opponents are guilty of propagating a large number of myths, such as that the uranium will soon run out, that nuclear emits lots of greenhouse gases, or that there is a huge amount of nuclear waste and the industry doesn't know what to do with it. The antis are clearly often wide of the mark, but the industry is also prone to hide behind its own myths. Examining the agendas at nuclear conferences and the speeches of key leaders shows that many people in the industry are somewhat deluded. They either don't think carefully about the key issues or else simply choose to ignore many years of evidence that fails to support their beliefs.

Most of the people in the nuclear industry come from a scientific or engineering background and are rather "at sea" when it comes to commercial, political or social matters. But this cannot explain why there is such a gulf in understanding. This can be illustrated by examining four myths commonly held by industry leaders: that financing is a substantial barrier to new nuclear build; that small modular reactors (SMRs) will provide a new answer for the industry; that many developing countries are now set to develop active nuclear programmes; and that climate change concerns will directly lead to a lot more nuclear construction.

Financing barriers

The argument that a shortage of finance, or the cost of it, are significant barriers to new nuclear projects is frequently heard and, indeed, industry conferences have been organised largely around this theme. The truth, however, is rather different: finance is not so much an input into a nuclear project as an output.

While everyone recognises that nuclear projects are extremely capital intensive, requiring lots of finance in the early stages that can only be paid back over a long period of operations, there is no unique financing mechanism that the relevant institutions can come up with to rescue a nuclear project that has questionable returns or too high a degree of risk for investors. This is the real problem: nuclear projects have largely become too expensive and risky to offer lenders the degree of assurance they require. Although there have been blanket bans on investing in nuclear within some of the development banks, this cannot all be politically inspired. Even with government incentives such as loan guarantees, fixed electricity prices and certain power offtake, nuclear projects today struggle to make economic sense, at least in the developed world. There are lots of different ways of generating electricity and the cost and schedule overruns at the latest projects are a warning to potential investors. They cannot be expected to put in either equity or loan finance if the prospective returns are inferior to those of other projects.

There is plenty of money available around the world today seeking good projects and financial markets are very creative at efficiently putting together the savers of the world and the likely borrowers.



By Steve Kidd

World interest rates are currently low, which removes one disadvantage of capital intensive projects. These low rates indicate that there is funding available but a possible shortage of viable projects. This dearth of opportunities clearly goes some way beyond the nuclear sector. The onus is, however, on the industry to come up with the projects that make economic sense. If costs are too high, ways have to be found to cut them. If building a reactor over six years is too risky, they have to be built in four. When a project demonstrates that it is viable, banks will be falling over themselves to provide finance. But if it doesn't, there is little they can do to help.

The current fashion for vendor financing doesn't really get nuclear away from this problem, unless there is a government subsidy behind it. Even if a vendor can come up with US\$20 billion for a four-unit plant (as Rosatom of Russia is apparently promising for Akkuyu in Turkey), it must still be sure of getting its money back at some point. Even with guaranteed power prices, will electricity customers in another country be able and willing to pay for the next twenty years? Vendors in the private sector only have market-related finance available to them, so cannot realistically get involved in this sort of project.

A new answer in SMRs?

In myth two, SMRs are heavily promoted today as a viable solution to some of the problems experienced by projects to build large light water reactors (LWRs). Assuming they are technically viable, the smaller capital expenditure needed to build a largely factory-built smaller unit and the shorter construction period are certainly attractive features. And if electricity production is moving away from large centralised generating units into a distributed power model (see May 2015, 'Changes in power systems – are they bad for nuclear?'), smaller nuclear units may still have a chance. They may have a chance today in remote areas in developed countries that don't have easy grid access.

Lower cost, however, doesn't necessarily mean better economics. Smaller nuclear reactors were developed back in the 1950s but the sensible decision was made to take advantage of nuclear's real unique selling proposition. That is the ability to produce huge quantities of electricity very reliably in one place, with a small fuel input and minimal environmental impact. Reactor units became progressively larger in an attempt to capture economies of scale in construction costs, but also (and very importantly) to minimise operating and maintenance (O&M) expenses.

For a time, this worked well enough, but it has come up against the barrier of steadily rising construction costs. The Chinese and Koreans can still build relatively cheaply, but in the Western world this is no longer the case. Lots of reasons have been advanced for this but the key is the indirect impact of the poor public acceptance of nuclear and the continuation of the general "fear factor" surrounding it (see October 2014, 'Public acceptance – is there any progress?').

The regulatory burden on nuclear is now substantial (and arguably excessive) in order to reassure the general public.

The jury is still out on SMRs, but unless the regulatory system in potential markets can be adapted to make their construction and operation much cheaper than for large LWRs, they are unlikely to become more than a niche product. Even if the costs of construction can be cut with series production, the potential O&M costs are a concern. A substantial part of these are fixed, irrespective of the size of reactor. And smaller units in themselves help little with public acceptance, the issue that is the real key to an expansive nuclear future (see February 2015, 'Nuclear power – how can public opinion be won over?')

Nuclear growth in the developing world

As for the third myth, many developing countries have expressed a wish to establish nuclear power programmes. The International Atomic Energy Agency (IAEA) works with them and has developed a "milestones" approach to them succeeding. But on current trends very few of them are likely to do so and for the same reasons that nuclear power has stalled in the most of the rest of the world.

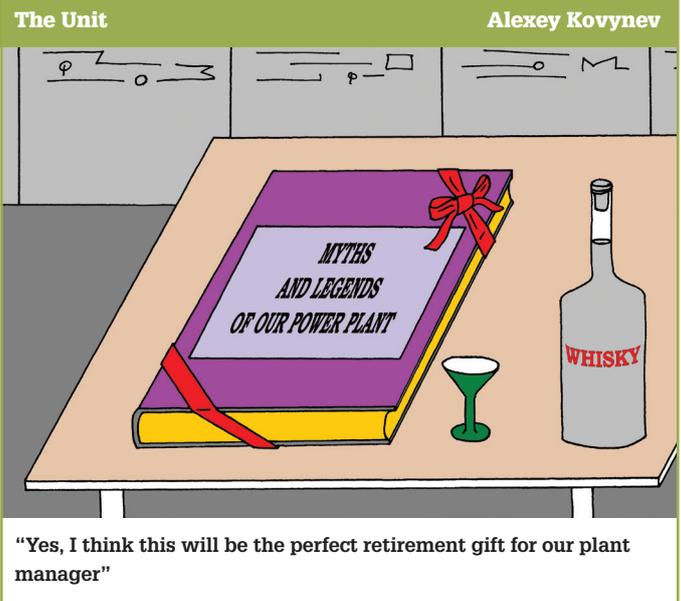
Although there are additional issues with new countries identified by the IAEA, such as the need to establish an independent regulator and to develop adequate human resources, these can be overcome if a country is determined to do so. The United Arab Emirates (UAE) is showing what can be achieved, but in most of the so-called emerging nuclear countries, the effort is rather half-hearted. They are happy to engage with a lot of foreign delegations but experience shows that establishing nuclear programmes needs very strong and focused leadership, able to overcome all the necessary hurdles.

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The fundamental problem is that nuclear in these countries suffers from the same public acceptance and economic problems as elsewhere. Why would these countries build nuclear power stations very similar to those that Germany is shutting down, even though they can operate safely for many more years? Countries can have their own distinct energy policies, but there are few potential Chinas or Koreas. The problems experienced in getting the Indian nuclear programme to the level desired by the national planners are instructive and are just as relevant to the Middle East and South East Asia, the most promising regions for potential new nuclear countries. It is ultimately the public acceptance issue that has to be overcome. Without this, the real prospects are not good. Maybe only three or four countries will get their first operating nuclear stations by 2030.

Environmental credentials

The final myth is that the world will start building lots of nuclear power stations to help counter climate change, as it becomes accepted as a green technology. This was advanced by Kirsty Gogan (April 2015, 'Why the environmental movement is important') and underlies the Nuclear Roadmap recently proposed by the International Energy Agency (IEA) and the OECD Nuclear Energy Agency (OECD-NEA), which was critiqued (April 2015, 'IEA and OECD-NEA – rapid roads to nowhere?').



The industry is grasping at a very thin straw. That may be because the COP-21 conference will be held in Paris this December, aiming to establish a legally binding and universal agreement on climate from all the nations of the world, but it is hardly excusable. All past evidence (which the industry chooses to ignore) demonstrates that nuclear will once again get chewed up and marginalised in the process (see January 2015, 'Is climate change the worst argument for nuclear?')

Sweden, an environmental paragon, has just announced plans to shut down its two oldest nuclear reactors earlier than planned. This may appear to be foolish, both economically and environmentally, but it will probably happen. A tax on nuclear and subsidised renewables in competition are certainly important factors. Yet this is what the industry is facing almost universally, and it will do so until it starts to play its cards right. Nuclear energy gets left off the agenda because the fear it engenders dominates policy while the positive virtues get ignored. Zero (or very low) greenhouse gas emissions is certainly a positive but there are sufficient alternative ways of curbing emissions (hydropower, many renewable energy technologies, carbon capture and storage and energy saving) that nuclear opponents can argue for it being ignored. They may offer sincere thanks to the nuclear industry for promoting the cause of environmentally-sound energy, but now ask it kindly to go away.

It must be argued that nuclear power should play an increasing role in satisfying the massive and growing energy requirements of this century. But with the industry prone to believing its own myths the outlook is not so promising. The fear factor has to be dealt with, as it permeates all the areas where nuclear faces difficulties. While it is still there, other inferior options will get preferred. Until the industry faces this, and stops getting side-tracked into low-return communications activities, it will never achieve its potential. Despite the moves towards more localised power generation, mass urbanisation means that there will always be a significant demand for large generating units which can produce power cheaply, reliably and cleanly. People need to learn that nuclear can do this. ■

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