



CARNEGIE-TSINGHUA
CENTER FOR GLOBAL POLICY

Transcript

CHINA IN THE WORLD PODCAST

Host: **Zhao Tong**

Guests: **Mark Hibbs, Li Ning**

Episode 30: China's Nuclear Future (Part II)

October 13, 2014

Zhao: You are listening to the Carnegie–Tsinghua, “China in the World” podcast: a series of conversations with Chinese and international experts on China’s foreign policy, international role, and China’s relations with the world, brought to you from the Carnegie–Tsinghua Center for Global Policy located in Beijing. I’m Tong Zhao, an associate in Carnegie’s Nuclear Policy Program based at the Carnegie–Tsinghua Center for Global Policy in Beijing. Today, I’m standing in for Paul Haenle to host the podcast.

I’m very delighted to be joined by two very senior nuclear policy experts. First, we have Professor Li Ning. Professor Li Ning is a distinguished professor and dean of the School of Energy Research at Xiamen University. He’s also director of Asia Development for TerraPower, a company founded by Bill Gates to develop innovative nuclear energy technologies. We also are very pleased to have Doctor Mark Hibbs. He is a Berlin-based senior associate in Carnegie’s Nuclear Policy Program. So thank you both for taking both for taking the time to speak with me today on the margins of Carnegie’s nuclear energy workshop in Beijing.

For now, and probably for many years to come, China’s nuclear energy development program is the most ambitious one in the world. Today, China’s new nuclear power plants construction accounts for about half [of the] global total, both in terms of unit number and electricity generation capacity. It is predicted that its nuclear capacity will reach 70 to 80 gigawatts by 2020 and may expand well beyond 100 gigawatts by 2030. This is despite the Fukushima nuclear accident in Japan in 2011, after which many countries have substantially cut down their planned nuclear development. Some people are wondering how China is going to achieve such a fast growth of nuclear energy and, at the same time, keep its nuclear energy program safe, secure, and sustainable.

One issue that has not received much attention is about the back end of the fuel cycle. In the case of China, does China have a plan for addressing issues related to the back end of the fuel cycle, including spent fuel storage, waste disposal, and decommissioning of retired nuclear reactors? These issues raise serious concerns for people who are suspicious about the sustainability and affordability of nuclear energy in general. These issues have created big problems for many of the most advanced nuclear operation countries. China, in this case, is less burdened in these areas, but in the near future, we’ll face the same set of problems, so what do you think China should better prepare itself for [regarding] these issues?

Li: Well, broadly, China has sort of a strategy and policy for it. You know, it’s to close a nuclear fuel cycle—reprocessing with intermediate low-level and high-level waste storage, repository, [and so on]. There are some rough timelines, out there in the future. But it was fairly, sort of a road planning, in a sense that follows what those other countries have done in a very broad, sort of strategic, broad-brushed sense. There’s very little implementation, sort of details, involved with it. So, when the large-scale nuclear power constructions started up taking up a lot of resources and attention, these issues kind of slipped—it was considered, like kind of, there was a solution and it’s not urgent. But some of the earlier operating power plants are already beginning to see this as a commercial back pressure into their operation. So they’re starting to work on these and they want the government to have a clear strategy and plan to deal with those issues. And we are also beginning to study this.

We had a three-part symposium in the last two and a half years just to deal with the back end, the waste management problem, and we had international experts and nuclear industry participants from China to discuss these and [it] exposed many of the problems, and also exchanged many of the ideas, because we now have updated technological options to deal with

some of this stuff [unlike] before, and we also have a lot more lessons learned. And again, I hope that the government and also the industry decision-makers can use the lessons learned and these newer options to solve [the issues] better. You know I had an American friend who told me that, 'you guys are in a much better position as we back then. We didn't know any better so we looked out some 30, 40 years and made some plans and we've gone through them in our work... Please don't repeat our mistakes. You know better, and you actually have better tools, [and] solutions available. Look at them and try to solve them, and try to plan ahead and solve them with better solutions.' So, I'm not saying this is a sure thing, but I think we have the basis to have a better solution.

Hibbs: I would only add to that that Chinese government and industry, shortly after embarking on commercial nuclear power generation back in the early 1990s, immediately announced in the shadow of their predecessors—the United States, Western Europe, and Japan—that were developing nuclear power, that the back end of the fuel cycle would be based on a plan to very soon begin commercial reprocessing of spent fuel and establishment of a plutonium fuel cycle for China's nuclear power plant program. What we've seen is that the timetable for the realization of those plans has been delayed. That's for the reasons, exactly, that Li Ning has pointed to, and we are now on the cusp of a situation where we could very well, during the period between 2015 and 2050, encounter significant breakthroughs in the way we think about and manage our spent fuel and nuclear materials.

I have argued that it would be very prudent and well thought-out for China to deeply consider what options it has and move forward in this direction. And in that regard I would only recall that—and this is a point that should be understood by the Chinese people—the material that we are talking about—the spent fuel—is actually a material which is very easily isolated and contained. If you do not reprocess the material right away, and you afford yourself time to derive a well thought-out roadmap for dealing with the spent fuel in the long term, in the meantime you have the convenience and the luxury of isolating and containing this material, limiting its danger by storing it, and not moving forward with processing the material for a while. That's what most countries in the world in fact are doing. So far, since the early 1990s when China began commercial power generation, it has followed the exact same reasonable, well-advised strategy that most other countries have done. That means that in fact, during the whole time that China has been developing its nuclear program, it has not been breaking ahead with reprocessing material right away, and instinctively is being cautious, thinking about the long-term implications of its fuel cycle policy.

I'm confident that in the decades ahead the Chinese government, together with its industry and its other stakeholders, will come up with [the] most optimal spent fuel strategy that they can possibly derive. As Li Ning said, China can benefit from the experience that other countries have acquired in this area, including experiences that he alluded to, which mean that in the period between about 1970 and 2000, efforts to prematurely develop a closed fuel cycle worldwide did not succeed primarily because they did not turn out to be cost-effective. So, you know, these are a rich legacy of experiences that we have with this problem, and China is in an enforcement position to be able to choose its future path very wisely.

Zhao: Some of the listeners of our podcast are actually foreign policy experts and international security policy experts who tend to look at things from a different perspective than people who are technical experts. I guess for the Chinese decision-makers and foreign policy experts, one thing

they care [about] a lot is, what are the national security implications of the fast growth of China's nuclear energy program? Will China's ambitious nuclear energy program increase China's energy dependency on foreign countries, especially taking into consideration the fact that China is not very rich in uranium resources? And in addition to that, it usually requires a lot of resources to ensure that nuclear facilities and radioactive materials are safe and secure from the hands of ill-intentioned non-state actors. In the case of the United States, President Obama declared that nuclear terrorism is a number one national security threat. How much [of] a threat do you think China faces from nuclear terrorism? Is the threat real, or is it exaggerated?

Hibbs: China is increasingly relying on the international market to supply the uranium for its nuclear power plant. This should not be a concern to the Chinese public. In doing so, China's joining a host of other nations, which, likewise, are understanding that the most economic way of providing fuel for their reactors is relying on acting in effective markets for nuclear fuel, including natural uranium and uranium enrichment services. [The] Chinese government is moving in that direction. They are indeed, as some worried people suggest, increasing their reliance on foreign supply for uranium, but this should not be a concern, because uranium is one of the most frequently found minerals in the earth's crust. It's located in many parts of the world and most supplies for natural uranium, including for China, are located in extremely stable countries, with well-developed industries for extracting uranium and developing best practices to make sure that uranium is being wisely managed, and that the interests of stakeholders in the countries where uranium is produced are respected. So this shouldn't be a concern. It's the way of the world, it's part of the globalization process. Instead of concerns that China will become more energy dependent because of its public opinion, China will benefit from lower prices for nuclear fuel. This is the reason, [the] rationale why the market is succeeding. It's because it's effectively providing fuel for 400 plus power reactors worldwide.

Regarding the issue of nuclear terrorism, I think it would be fair to say that not too long ago, less than several decades, there were some questions asked by China's foreign partners on how secure the materials in China were, principally because China is a very big country. There is a military nuclear program in the country which is not exposed to a lot of transparency and information. It's a military nuclear program in China [hence an issue] of national security, and information is not provided in great amounts, so it would only be natural that people would ask questions about whether this sensitive question of nuclear terrorism in China would be well-taken care of. In recent years, what we've seen is a very considerable effort by China to address these concerns, including recently when they have engaged in the [best practices exchanges and training] process by, among other things, establishing the Center of Excellence for Nuclear Security, which will be set up in Beijing and working with other countries in the Asian region to coordinate activities to improve nuclear security in these countries. There are concerns about nuclear security worldwide, [and] China is not immune to these concerns—many countries have them.

The biggest concern is not, in China as elsewhere, the security of nuclear weapons-related material so much as more likely a scenario [involving] radiological material, such as sources of radioactive material which [are] found in equipment used in hospitals, clinics, and universities. It could be lost or stolen, and used in a primitive device that would scatter these radiations and probably not do a great deal of damage, but create a certain amount of uncertainty and panic in the local populations. This is a public problem which has emerged in the United States, for example as early as in the 1980s, when nuclear regulators found that there were as many as 80 or 90 thousand

of these sources that were not accounted for and were not tracked by regulators because there was no regime to police these materials and make sure that they were accounted for. The Chinese situation is similar to that, where China and many other countries have many users of radiological materials. China, like other countries, including Western countries and the United States, has had to establish a regulatory regime for these materials to make sure that they are accountable and are being used safely. That's part of the problem of nuclear security, which is to make sure that all these materials—nuclear materials and radiological materials—are basically under lock and key and they're accounted for. But China—reassured by some observers, including NGOs that were studying this close-range—is making considerable progress in addressing these issues and engaging with the rest of the world in eliminating this threat.

Li: Yes, Mark, that's a very comprehensive answer, so I'll follow up very briefly. You know, uranium worldwide is not as scarce as people thought at the beginning of the age of nuclear power. Also, it turned out to be not as scarce in China as many people thought. It was not a fully explored natural resource in China and there were some recent big finds in China. Also, many of the uranium-rich resources are in places [that are] geologically-stable and friendly to China. Also because, you know, one thing about nuclear fuel is [even if] you have a very small amount, you can easily store [it], but it'll supply you energy for a very long time—so it's not like the other things that can be easily disrupted. So from that perspective, I don't think we should be overly concerned with uranium resources. But just as well, if we were to go into a bigger expansion of nuclear power for a long time, I think technological advances will be needed to increase utilization of uranium, [that is] lighter technology. [We have been] working, you know, with Bill Gates and others in designing nuclear reactors and some other technologies to increase the uranium utilization by a factor of five, ten or even fifty times, so we are talking about really large [gains] of uranium resources if those technologies were realized.

In terms of nuclear terrorism, it was not a very high priority in China. In 2008, during the Beijing Olympics time, it was barely something that the Chinese government and the security forces paid much attention to, and the U.S. and other countries were trying to [push] China into installing more detections and stuff. You look at the society and stuff—it hadn't been a fairly high-visibility topic, nor [do] I think that the separatist terrorists [and so on] would have that capability and access. A lot of these local disturbances etc. were not terrorists but rather sort of a social dissatisfaction. So, you know, I'm a little bit concerned, you know, to say that's a big problem publicly because it might become a self-fulfilling prophecy if you emphasize the severity and consequences of it. But I do wish that, you know, internally, we are paying increasingly more attention to it. I think what Mark said about China establishing the Center of Excellence and safeguards, etc. are steps in the right direction.

Zhao: Thank you very much. This has been a very interesting and informative discussion. Thank you both, Professor Li Ning and Doctor Mark Hibbs, for spending time with us today. That's it for this edition of the Carnegie-Tsinghua "China in the World" podcast. If you'd like to read or learn more about China's nuclear energy development plans, you can find more articles, events, and podcasts on our website at www.carnegietsinghua.org. I encourage you to visit and see the work of all our scholars at the Carnegie-Tsinghua Center. Thanks for listening and be sure to tune in next time!