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Transcript

CHINA IN THE WORLD PODCAST

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Episode 29: China's Nuclear Future (Part I)

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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 by the Carnegie–Tsinghua Center for Global Policy located in Beijing. I am Tong Zhao, an associate in Carnegie’s Nuclear Policy Program based at Carnegie–Tsinghua Center for Global Policy in Beijing. Today I am standing in for Paul Haenle to host the podcast.

I am very delighted to be joined by two senior nuclear policy experts. First, we have Professor Li Ning. Professor Li Ning is a distinguished professor and a dean of the School of Energy Research at Xiamen University. He is also director of Asia Development for Tera power, a company funded by Bill Gates to develop innovative nuclear energy technologies. We also are very pleased to have Dr. Mark Hibbs. He is a Berlin-based senior associate at Carnegie’s Nuclear Policy Program. So thank you 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 2011 in Japan, 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 [as keeping] its nuclear energy program safe, secure, and sustainable. Earlier this year, three years after Fukushima, China sent signals that it will soon resume granting permits for new nuclear plants in [its] coastal region. In comparison, a more controversial and intensively debated issue is whether China should resume nuclear plant approval and construction in inland provinces. Most nuclear plants depend heavily on sufficient water supplies but China’s inland regions are famous for the lack of water resources and the situation make get even worse if climate change brings about even less natural precipitation in the future. This might create safety concerns for inland nuclear plants. As experts on nuclear energy, what are your thoughts on whether or under what conditions should China move ahead with building nuclear plants in the inland? Doctor Hibbs, do you want to go first?

Hibbs: It is not unexpected that the Chinese public is concerned about moving nuclear plant construction to inland sites in the aftermath of Fukushima incident. This is because the accident in Japan made us very aware that an essential part of the safety of nuclear installation is its sufficiency of logistics, information, well-developed site planning, an excellent preparation, [and] availability in case of emergency. I think it is possible that some Chinese citizens are concerned that the farther away from well-developed infrastructural areas in China where nuclear plant might be located, the more vulnerable it might be to disruption in case of a severe accident event. Likewise, people are naturally concerned about the water management because this was a very essential aspect of Fukushima. In Fukushima, what happened was that water management was not very well organized and maintained, leading to contaminations which could have been avoided had the Japanese industry and government been better prepared. So it’s natural that the Chinese public is concerned about this and also logical that because of the legacy of water storage issues in inland sites, that this would be a concern. That being said, it should also be pointed out that any nuclear plant project that would be built in China will have to be built on where the water management and logistic concerns are addressed on a plant-specific basis. That is a responsibility

of the regulator, the NNSA in China, working together with vendor and the operating company to ensure that in developing site planning and an operating plan for the reactor, that they have covered all of the issues that may arise because of the specific location of the site. In other parts of the world, these issues can be addressed; there is a well-developed body of knowledge concerning both the roadmap for addressing such problems as well as from technical parameters and requirements. So I am confident that if Chinese authorities are very well informed and the work with their international counterparts with great expertise in this area and that there is collaboration between the safety regulator in China and the companies that would be responsible for building a reactor, this problem could be overcome.

Li: Ok, yeah, I agree with you, Mark. You know the thing about nuclear safety, whether it is inland or whether it is coastal, it should all be the same. It is not because it is inland that it should not be any less safe, or because it is coastal we can allow more lapse or anything. But we do need to consider [the impact of] the site and environment [on] the safety of the plants and also the potential consequences of severe accidents taking place. After Fukushima, lots of people realized that when reactor goes into a severe accident, it has a potential to release large amount of radioactivity, contaminant the environment and the public has not responding very well. So, it is a valid concern for people to have questions about these. However, some of these questions were because of [a] lack of sufficient public inclination out there explaining what the conditions, what the accident consequences, and what are the safety and emergency responses and measures that could be put in place to prevent them from happening. So these issues, I think, on the one hand, would require expert panels and regulators to figure out specifically for those sites these issues. They also needed a little bit more public education and information, sort of a process of informing the public of these. And also I would ask some of the public opponents to the inland nuclear power plants to take a somewhat more measured approach to voicing their opinions on these. If we could come together to agree on some neutral, transparent public protocol and processes to exchange ideas and debate about these and to put nuclear into a broader picture of looking at other sources of energy supply and environmental issues, I believe we can come to a reasonable agreement. If indeed there are better solutions out there and nuclear is a worse solution, I am fully not going inland. But in many parts of China the bigger risk is not this nuclear safety risk, it is a much broader issue. So if we are blind to those problems and singularly focused on the nuclear safety problem, I think in the end it would be a lose-lose for everybody involved.

Zhao: Professor Li Ning, you touched upon the issue of the role of nuclear energy relative to other sources of energy in China, and some people predict that nuclear power will constitute as much as 15 percent of China's total electricity generation by 2040. I guess my question is does nuclear energy have the potential to fundamentally improve the structure of China's overall energy generation and make it much greener? Given the serious environmental problems in China today, many people hope that nuclear energy will become the solution for mitigating China's air pollution. But realistically speaking, are people overly optimistic about what nuclear power can achieve in China? What role can nuclear energy play in addressing China's environmental problems?

Li: That is an excellent question. Nuclear power right now only generates about 2 percent of the total electricity in China. Clearly right now, it is a clean and low-carbon energy resource but it is not enough. It is too small, and if we cannot find a way to expand it more substantially over the

current stat— both in scale and speed—I think the potential will not be realized. However, I think we should not overlook the possibility of technological advances and innovation in the field, both from the technology sides but also from the business sides that can have a much bigger impact. I have been working in this field for a long time and I've seen in the past several years, especially since Fukushima, [that] there are a lot of people in the existing nuclear industry and also those who are interested in a low-carbon energy who are beginning to come in to try to solve the challenging problem in this area. There is quite a bit of innovative drive and interest surrounding the events related to nuclear power technologies. On this I have to say that I am optimistic. I've been looking at many other energy technologies as well. Some of them are growing but lots of the technologies have problems much worse than the nuclear [energy's] problems. So I think given this kind of landscape and the timing, I am looking [forward,] within next 5 or 10 years, to some substantial breakthrough that could lead to that bigger expansion [of nuclear power] and I am looking toward it being more than 15 percent in 2040 timeframe.

Hibbs: Li Ning, I would only add that because of uncertainties that exist in terms of what technology options China and the other countries will have in next 3 or 4 years, it is very difficult for us to predict exactly how big China's nuclear program will be. It will require China to build out an infrastructure including human resources and materials and equipment, know-how, international connections, and findings to be able to build out and expand the nuclear program in the way that you described. That being said, it should be pointed out that in the previous decades, other countries were capable of substantially building out their nuclear programs over the period of few decades. That happened in the United States in the 1960s and 1970s and the building actually continued into the 1980s and the 1990s.

What China faces is a challenge because of the size of its population. In fact, the Chinese people are getting richer than they have been in the past and they have more ambitious plans for using energy. China will be in a position to build out its nuclear program to an unprecedented level compared to the countries in the past. This is one of the reasons there are some anxieties and some uncertainties because nuclear program with as many as 300 reactors or more than has ever been realized anywhere in the world. But China is in a very interesting situation right now where it's able to take advantage of the technological changes which are happening in a fast rate, including the nuclear, which as you have said Li Ning there will be breakthroughs in the coming decades which could have major changes in Chinese nuclear choices and result in a larger nuclear program than perhaps many people have anticipated.

Li: Let me follow up on that. China, in a way, has two unique advantages. One, it has a latecomer's advantage. [From a] lot of the problems that had happened in the U.S., European, and Japanese programs, there are lots of lessons learned that the Chinese industry can pick up on. And, the technologies that Chinese industries are using and the reactor designs that are being built are 40-50 years more advanced from what was used back then. Second, because nuclear is a very large system and industry, the scale factor is more important than lots of other industry. It just so happens that China has a natural scale that can support it—not just the population, but [also] the industry in power-generation equipment and plant manufacturing and the operation because China these days makes and sales over 100 Gigawatts of power-generation capacity. Some of them are the world's most advanced supercritical coal fired power plants. So, the technological and manufacturing basis are far more advanced than when the world was experiencing the first nuclear power expansion. So that gives me some confidence. I am not saying this is a guarantee but these

are the things that lots of people are looking in China do not quite realize that such advantages exist.

Zhao: So both of you agree that China has a capacity to significantly expand its nuclear power in the near future. But another issue is, what is the public acceptance of nuclear energy in China? I know Mark you are from Germany where the public sentiment is very much antinuclear and this attitude has led the German government to make the decision to completely phase out nuclear energy. I guess my question is what is the situation in China? How much does the Chinese general public care about nuclear energy and accept nuclear energy as important source of clean energy supply? There have been cases in China where construction of nuclear projects was obstructed by protests of local residents. How much is public attitude is going to affect the nuclear power decision making in the future. What can be done by the government to communicate with and consult the public more effectively?

Hibbs: Germany is a very rich country and people, over many decades in Germany, have acquired a very high standard of living. One of the results of that in the public policy area concerning energy generation is that the people in Germany seem to feel that they don't need the nuclear reactors because they can use other sources and they can afford to pay higher prices for sources of energy which they themselves don't generate. What I mean by that is Germany in this particular case is the country which is in the middle of the EU and it is embedded in a very dense infrastructure with a lot of generating capacity in many areas and it is widely anticipated that Germany will follow the nuclear phase out and end up importing large amounts of nuclear electricity from nuclear power stations which are built just outside of its borders. It will probably be importing that electricity from Switzerland, France, Scandinavia, perhaps from the Poland, the Netherlands, [and] Czechoslovakia. So, the German people are in a fortunate position to be able to essentially export their risk concerns because they can rely on outsiders to supply their clean energy. At the same time, what we are seeing in the near time is that as a result of the decision in Germany to phase out its nuclear program, German emissions from the power generation of coal fire plants are increasing. This is something that eventually will be a concern of German public and government because Germany has committed itself to substantial reducing its carbon emissions in the future.

Regarding China, the Chinese situation is totally different. When you step off an aircraft in Berlin and you land in the country, the air is very clean. You arrive at Beijing and you look outside the window—from where we are right now, I'm looking in the direction of the Freedman Hills, which during a day good weather you can see brilliantly outside of the window—you see overcast air, clouds, that are covered with dense amounts of coal emissions, heavy metals, other things. So the Chinese people know this and when you get off the plane in Beijing, you see that the situation is very different and the Chinese people are deeply aware of that. They know that during the period of time in the last two or three decades, since they have been catching up and industrializing, that they are breathing progressively dirtier air. They want this situation to be rectified and the Chinese government is deeply aware [that] that dissatisfaction could potentially become politically mobilizing in the future. They want to make sure that the Chinese population is breathing cleaner air and has a healthier future.

So to many Chinese people nuclear energy is a part [of] that solution. It's part of that solution because, compared to the Germans, the Chinese have less of a choice. They are generating a huge amount of electricity with coal. Germany likewise is doing this. They are

committed to decarbonizing their economy but, like I said, as they phase out their nuclear program the result has been an increase of coal-fire generation. The object of the nuclear expansion in China, one of the key objectives, is to dramatically reduce the amount of coal which has been fired to produce this energy. So that's the very simplified equation that the Chinese people face. They see nuclear energy generation as a way of substituting from coal which is producing the air they are breathing. That it is not the way most Europeans see the situation because they are living in a totally different environment where those problems have been externalized to a certain extent.

Li: After Fukushima, for quite a while, I was asked all sorts of questions and it looked like the public sentiment is turning negative to nuclear for a while. There was some hysteria as well. But very few years afterwards, like Mark said, the problem of environmental pollution, dirty air, and so on was coming up. You see it, you experience it, and you can't escape from it. Before, with some of the pollution you might have been able to get away from it; but now, you can't. I've been getting a lot of comments from people asking, 'Can nuclear help solve this?' and, 'we should do nuclear.' In some of the technical communities, a very high share of people who are not nuclear technologists or proponents are asking for starting nuclear power. On the general public side, I think China—unlike the Germans who have experience Chernobyl fallout and some of the memories are still quite fresh—the Chinese people generally have not experienced nuclear radiation accidents or disasters. There is no deeply-rooted fear of nuclear compared to other countries. So while there is public sentiment obstructing some power plant construction, it hasn't risen to that level.

Generally if you look at China's social development, you can pass through the first or second wave of industrialization and I think many parts of China are in the second phase or the later phase of the second stage of industrialization or urbanization. The society has not gone to a point where power and clean air is already a basic condition. [Therefore] the drive to have more power and also to get clean air exist at the same time as opposed to some other places where you just want the clean air and clean environment, because there is sufficient power and standard of living already. With that kind of a drive, the broader society in China may not be strongly against nuclear. They may not be strongly in favor either because nuclear is a pretty small sector right now. But, I don't see it becoming a very strong anti-nuclear [sentiment] on a broad basis in China.

Zhao: Thank you very much. This has been a very interesting and informative discussion. Thank you both Professor Li Ning and Doctor Mark Higgs 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 and learn more about China's nuclear energy development plans, you can find more articles, events, and podcasts on the Carnegie–Tsinghua website at www.carnegietsinghua.org. I encourage you to explore our site and see the work of all our Scholars at the Carnegie–Tsinghua Center. Thanks for listening to be sure to tune in next time.