

Nuclear Power and The New Silk Road

Dr. Wu is Dean of the School of Nuclear Science & Technology at Lanzhou University, China. His presentation, titled "Future Perspectives of Nuclear Power in the New Era of the Silk Road," was delivered to the Schiller Institute conference on his behalf by Toni Kästner.

The training of qualified workers through the peaceful development along the New Silk Road is one of our tasks, since our institute is located in the capital of Gansu province, Lanzhou, which is located on the Silk Road and closely related to its development. This is one of the

reasons that this speech is part of a series of speeches, that deal with the past and the future of the Silk Road.

But, what does "nuclear" mean? This question can be answered in different ways.

In the past, nuclear meant armament, threats, and similar things. But in the future, nuclear will stand only for peaceful and sustainable energy.

Therefore, I will look at this issue from the perspective of the development of the Silk Road.

In Chinese writing, there are two characters that sound alike, but mean different things. But the fact that they sound alike, demonstrates that they are somehow related, anyway.

For me, in the Chinese language, nuclear energy means peace through development (Figure 1). And that was, after all, the fundamental idea of the Silk Road in the past, and that is what it will be in the future.

FIGURE 1
What Does Nuclear Mean?



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FIGURE 2
Before Fukushima, 11 Nuclear Units in Operation



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China's Future Perspective

There are presently 19 nuclear power plants at 7 locations (**Figure 2**). Another 28 gigawatts are under construction, and by 2020, 58 gigawatts will be online.

They will not be built along the eastern coast of China, but more and more in the interior (**Figures 3, 4, and 5**). In this endeavor, all work is aimed at peaceful and sustainable development of nuclear power in China.

Thus, the percentage of nuclear power in the production of electricity will be expanded to 4% by 2020, to 10% by 2035 and, together with renewable energy, to 30%, by 2050 (**Figure 6**).

To reach this aim, China needs to build and develop more nuclear power plants.

But, first of all, I want to show why we chose nuclear energy:

- because we have to re-evaluate, for a number of reasons, coal as an energy source;
- because we do not want to create a conflict be-

FIGURE 3

Peaceful Use and Development of Nuclear Power in China



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tween economic growth and the environment;

- because we will be more able to even out energy prices;

FIGURE 4

Inland Nuclear Power Plants, pre-Fukushima



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Before the Fukushima Daiichi accident, nuclear power construction was no longer limited to the coastal region, but the first inland NPPs were planned for Hunan, Hubei, and Jiangxi provinces.

FIGURE 5

Currently Planned Inland Nuclear Power Plants



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Many provinces are actively preparing to build and expand NPPs, including Jilin, Chongqing, Anhui, Sichuan, Henan, and Hubei, as well as Guangdong, Zhejiang, Liaoning, and Shandong, where NPPs already exist.

- because we want to overcome the limitations of other energy sources in regards to the availability of resources and their compatibility with the environment;
- because the development of nuclear energy boosts productive powers, especially in the area of nuclear power technology.

The challenges we are confronted with in this endeavor are:

- safety of the installations;
- protection of the installations against terrorism as well as the emission of dangerous substances;
- handling of radiation products;
- economic competitiveness;
- sustainability.

But, aside from these general challenges we are confronted with, there are some challenges that are specific to China. Among these are:

- the availability of nuclear materials and resources in this area;
- competitiveness in the construction and installation of nuclear power plants;
- our own capacities for innovation in nuclear technologies;
- construction of nuclear power plants in the interior parts of China;
- training of skilled workers in nuclear science and technology.

This last challenge for China, concerning the training of skilled workers in the area of nuclear science and technology, is a task of our university in the city of Lanzhou, which is located along the Silk Road. How important this area is for China, today, is demonstrated by a look at the past, the present, and the future of nuclear science in China:

1895-1942: The first steps: founding of radio chemistry and nuclear research in China;

1942-86: Golden Era: construction and use of nuclear technicians;

1986-2000: Decay

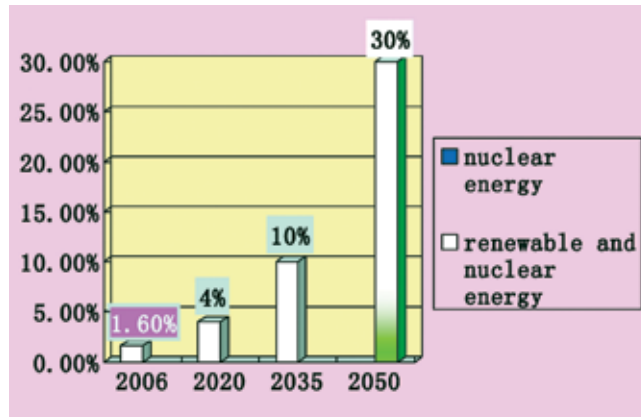
2000-11: Renaissance of nuclear technicians

2011-?: Fukushima

After the incident in Fukushima, it was, at first, not clear how China would proceed, and whether China would stick to its plans. Therefore, there were intensive discussions among specialists. They arrived at the con-

FIGURE 6

Goals for Nuclear Energy Share of Total Power Production



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clusion that China will continue to develop its nuclear energy.

Nuclear Training Today

While in the last century, our universities hesitated and in some cases stopped some nuclear programs, we have now restarted programs in the areas of radio chemistry, nuclear technology, nuclear physics, nuclear medicine, etc. Similar developments are occurring at a number of institutions outside of universities.

We have to recognize that the number of nuclear workers needed depends on how many nuclear power plants are in use. Therefore, it is clear that faster development of nuclear science and technology will enlarge the labor market for skilled workers; there will be a greater demand for skilled workers, and this creates a challenge, whether we will be able to meet this demand.

The skills that are affected by this are planning, construction, and running of nuclear power plants and the nuclear fuel cycle.

If China is to meet this demand, this would require that the number of skilled nuclear workers rise to 25,000 by 2020. Because of the speedy development in recent years, demand will increase until 2015 and will then slow down and stagnate after 2015. This means that by 2015, 1,200 nuclear workers will be educated:

350 engineers for fuel chemistry;

330 reactor engineers;

90 workers in basic sciences like radio chemistry and nuclear physics;

140 workers in geology, uranium mining, and metallurgy.

But not only in nuclear science and technology will we need skilled workers, because of these development plans, but also in areas like finance, law, and protection of the environment.

Thus, the challenges are:

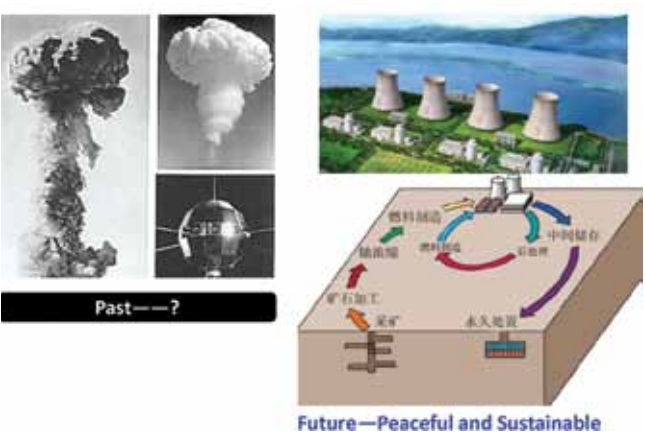
- to provide the needed skilled workers;
 - the lack of teachers;
 - the laboratories are too old and badly equipped;
- Not enough is being done to attract students. Political decisions can liberate all subordinated institutions. We will need decisions by the People’s Congress to provide long-term financing for these programs.

Progress that has already been made:

- the government has decided in favor of sustainable financing for training programs in the areas of nuclear science and technology;
- companies are getting involved and sharing their facilities with universities;
- universities are working to renew their departments and equipments.

In conclusion, I can say that the peaceful use of nuclear energy along the Silk Road will enhance the training of skilled workers in the areas of nuclear science and technology. The Chinese people love and hope to set up a peaceful world. We should ensure the peaceful use of nuclear energy. We hope everybody in the world will enjoy peaceful development (**Figure 7**).

FIGURE 7
What Does Nuclear Mean?



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