

## **Transcript of GABI interview with Dr. Chang Seon-hung, President of the Korean Nuclear Society**

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Interview conducted by Martha Legocki

**Martha:** Recently, President Lee Myung Bak of South Korea delivered the keynote address at the UN high-level meeting on nuclear safety and security. During his speech, President Lee said that the Fukushima nuclear accident that occurred last March in Japan should not be a reason to back away from nuclear energy. How did the Fukushima accident affect the prospects of nuclear energy in Korea and the rest of the world, and how does Korea hope to be a leader?

**Dr. Chang:** As you know, in the world, there are three types of energy. So one is fossil energy, such as coal, oil, gas. And nuclear energy, and renewable energy. But as you know, the fossil energy is modernity's use of current energy, but climate change, also green house gas issues, as you know you must cut down the use of fossil energy. So now in the future we must focus on nuclear and renewable energy. But renewable energy cannot stand; they are very limited. So for example, everybody talks about solar. But solar energy in U.S. and South Korea, it only counts for .1% of total energy supply. So because renewable energy is only a limited supply, and still it's very expensive. For example, electricity generation, the price of solar energy electricity, is almost 20 times that of nuclear energy. So that's why, I'm pushing, the development of renewable energy. And I'm pushing the research and development of renewable energy. But there is still a long way to go. For the time being at least, nuclear power must play a very important role. So even though the Fukushima accident affected some parts of nuclear power, I am very confident that nuclear power still is a very important source of energy in the future. For the short term, maybe it will slow down, but in the long term, we need nuclear power. At least 50 years, at least. So nuclear power plays an important role in this century.

**Martha:** In the slowdown that you mentioned after the Fukushima accident, South Korea has stepped forward as a leader in the initiative.

**Dr. Chang:** Yeah.

- Martha: And has actually shifted over the years from an importer of nuclear technologies to a major exporter. What sort of role do you envision South Korea playing in the next few years?
- Dr. Chang: Yeah. I'd like to introduce some history of Korean nuclear development. For example, we started our first nuclear power plant operation in 1978. One year after, our start of the nuclear power plant, Koryo Unit 1, we had a TMI accident, but after TMI accident—
- Martha: --that's...Three Mile Island?
- Dr. Chang: Yes, that's right. U.S. stopped building new power plants. But Korea continued to build, after the TMI accident. So we utilized the TMI accident for the improvement of safety. Then, in 1986, we had the Chernobyl accident. In 1986. But Korea really invested a lot for research and development, and also technology transfer, and the localization of nuclear power plants. In 1986. So in Korea the localization problem actually started in 1986. Until 1995. That's very important. So we utilized the Chernobyl accident for the good opportunity of the, you know, localization of the technology and design of nuclear power plants. At the time, the market was the, okay, buyer's market, so you could easily get the transfer of technology from the U.S. and other countries, so you know, you utilized it. Korea also had a very hard time in the IMF period. AT that time you developed advanced directive called APR 1400, but at the time many people discouraged the development of APR 1400. Actually, our government strongly pushed the development of APR 1400. Finally, you can export APR 1400 in 2009. So, based on our history, Korea always utilized the crisis into opportunity.
- Martha: There are always lessons to be learned.
- Dr. Chang: Yeah. Lessons to be learned. So, for the same reason, maybe Korea can utilize the Fukushima accident for the opportunity for another jump, another leap.
- Martha: So what kinds of lessons do you think Korea can take from the Fukushima accident?
- Dr. Chang: From the Fukushima accident there are several—many, many lessons, but the most important thing is that you recognize the importance of safety and you must enhance the safety. But also again, the decay hidden remover is the key issue for the assurance of nuclear safety. So

in the future, you must strengthen the decay hidden remover system, under extreme conditions, such as tornado, earthquake, and tsunami. Also another important lesson is station blackout accident.

Martha: And that's when the power cuts off completely?

Dr. Chang: Yes. A power cut due to natural disaster. It's very important, so right now you are developing more passive safety system which does not rely on electricity. So the safety system acts on natural power, natural force, such as gravity, or natural circulations. So right now, you know, you are developing new mechanisms for safety systems. Also you enhance the reliability of power supply systems, such as diesel generators. Right now, those kinds of things. But you need more links, linking the research to operations. So you need a manual for civil accidents. Civil accidents means the ... accidents. So those kinds of things are good lessons from Fukushima.

Martha: Absolutely. And how about Korea's relationship with regards to nuclear energy with the rest of the world, with other countries?

Dr. Chang: Right now, Korea merely has several initiatives for other countries. Of course, Korea already exports nuclear power plants. But the important thing is our university, together with the Korea Institute of Nuclear Safety have an education initiative for nuclear safety. So, you have the nuclear safety school, and also you have some degree program for nuclear safety. So right now you are inviting almost 15 countries, students, to participate in the nuclear safety program. So Korea is the leader for international collaboration in the nuclear safety area.

Martha: Korea does seem to put a heavy emphasis on safety—on nuclear safety. Just a few days ago on October 27, Korea launched the presidential commission on nuclear safety and security. What are the purposes and roles of that commission?

Dr. Chang: Korea already has, you know, a good nuclear safety system, but after Fukushima, we'd like to make stronger nuclear safety systems. More independence. In the past, the nuclear safety commission was under the ministry of education, science, and technology. But right now, but the ministry of education, science, and technology, they are in charge of research, basic research and safety. But right now, you'd like to enhance the position of the nuclear safety commission under the president, and become more independent. So we'd like to have a more

independent regulatory body. So you know, that's one important way to—also, popular acceptance is very important. To make the public more comfortable, you need a more independent regulatory body.

Martha: What is the current public atmosphere with regards to this emphasis on safety in nuclear energy development in South Korea?

Dr. Chang: In Korea, right now some environmental groups say that the Korean nuclear industry is very closely linked; work together with the Korean government—nuclear regulatory body. In some sense it's good—but in some senses maybe it's contradictory. So we'd like to be more independent. That's why we established nuclear safety commissions.

Martha: I know that nuclear energy is quite politicized here in the United States; is that something that is also true in South Korea? Is that another possible advantage to having the regulatory commission a little bit separated from the government?

Dr. Chang: Yeah, yeah that's right. Look, people want more independence. But I think some types of nuclear industry and regulatory [bodies] must cooperate. But some must be independent. There must be some optimum distance, too far is not good—too close is also not good. They must maintain an optimum distance.

Martha: And only time can tell--

Dr. Chang: Yeah, yeah—

Martha: --where that distance should be.

Dr. Chang: Yeah that's right.

Martha: So what is *your* role?

Dr. Chang: Right now my role is—okay, I'm the president after the Fukushima accident. So I'm doing my best to get public trust again for nuclear energy. So right now I'm thinking in two ways: what is the localization of our society? So right now I'm making some efforts toward cooperation with local communities which have nuclear power plants. So we'd like to make local residents feel more safe, through the safety culture enhancements and public acceptance. So that's important. Another thing is we'd like to think about how to make a good city for the cities with nuclear power plants. So anyway, I'm making an effort

to get the public acceptance in the local cities which have nuclear power plants. In Korea, we have four sites, so maybe I'm visiting. And I'm also asking our members of the nuclear society to visit our sites as much as possible. So we'd like to meet the residents at the sites, and to make them feel comfortable. That's a very important area. Another thing is we would like to enhance the technology—nuclear technology. Also we'd like to share our lessons—our technologies—with other countries. So that's related to globalization. So one is localization, another is globalization. So exporting or sharing the technology, sharing lessons, sharing education—so there are two axes: one is localization, one is globalization.

Martha: In terms of incorporating some of the lessons that you mentioned from the Fukushima accident into safety considerations for nuclear power plants in South Korea, how much focus do you think should be put on the physical, technological improvements that might strengthen the safety there, and how much emphasis should be put on the human, procedural component in terms of what to do in a time of—?

Dr. Chang: Yeah you made good questions—good comment. I think you need both. You must enhance the hardware capabilities. Also you must enhance the software capabilities, such as procedures, education, and safety culture. So both—you need to enhance. But I think both are very important. Software is very important—software, and safety culture, they're very important. As well as hardware enhancements.

Martha: Are there any places in the Korean system that you see could actually be problem spots or potential points of issue?

Dr. Chang: We are focusing on civil accidents. In a nuclear power plant, "civil accident" means...fuel failure. For these things, we must develop some hardware such as hydrogen igniters, passive hydrogen igniters, more strong containment, more reliable diesel generators, and besides hardware enhancements, you need good procedures—good manuals and education. Good manuals and education for operators is very important for civil accidents. That's the main focus: education and manuals for civil accidents—very important. As well as hardware enhancements.

Martha: During his keynote at the UN that I'd mentioned before, President Lee has clearly put Korea forward as a leader in the development of nuclear energy in the post-Fukushima world. What do you think will

be the next steps taken by Korea in terms of nuclear energy development?

Dr. Chang: Korea continued to build over the past 30 years. For example the U.S.—they stopped after the TMI accident. So in the last 30 years, they didn't build any nuclear power plants. Also most of the European countries, except France, they didn't build nuclear power plants after the Chernobyl accident. Korea steadily built nuclear power plants, steadily—good experience in design and licensing. So right now Korea can share our knowledge. That's very important because Korea has a good supply chain for manufacturing and construction. So in nuclear power plants, construction is also very important, as well as manufacturing and design. In nuclear power plants, time is diamond—one day delay in construction is several million dollars. So time is not gold—time is not money—time is diamond. Because it is so important. So we'd like to share our experience in design, manufacturing, and construction. So Korea has a good supply chain system from design to manufacturing and construction.

Martha: What sort of relationships does Korea already have with other countries, and is it looking to expand—in a specific way? Does it have other countries that it has its eye on?

Dr. Chang: Even though Korea exports total systems to the United Arab Emirates—the UAE—Korea exports many components--component-based export to many countries.

Martha: So there is some exportation of entire power plants, and then there—

Dr. Chang: Yeah—Korea already exports major components, such as steel generators, to the USA and also Korea exports reactor...and steam generators to China, so that kind of thing we're already doing for export. At this moment, to the countries who don't have any nuclear programs, we'd like to export education, such as safety and design of nuclear power plants.

Martha: So does Korea export education as well?

Dr. Chang: That's right. That's very important. As I mentioned before, Korea already invites students from the countries that don't have nuclear programs to our institutes. Our institutes are very physically close to the Korea Institute of Nuclear Safety. So we have special programs for

education on nuclear safety. So right now we already give education for students from almost 20 countries on nuclear safety.

Martha: Do you know of other university-level programs of that kind in the world, or is South Korea quite unique in that respect?

Dr. Chang: South Korea is the most active—

Martha: In terms of focus on safety?

Dr. Chang: Yeah.

Martha: Well I know you're very busy, Dr. Chang—I really appreciate your time. That's all the questions I have for you today.

Dr. Chang: Okay I enjoyed your questions.

Martha: Yes, thank you very much.