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Global Nuclear Power Market: Competition, Strategic Partnerships, and Implications for National Security

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- I want to thank FNS and GABI for the opportunity to speak at this event today. The future of nuclear power is an important subject and this is a very opportune time to be having this discussion – because we are at a critical decision-making point.

- In my view the context for evaluating the contributions and value of nuclear power in the 21st Century have evolved significantly from the 20th Century. But the evaluation framework has not been adequately updated and as a result the conversation around nuclear and the decision-making about its future are out of step with modern realities.

- The challenges, the opportunities, the financing, the competition, the technology, the markets, and the expectations are all different today than they were even at the close of the 20th century.

- All of these issues – and more - are entwined and you need more than single-issue, siloed communities to tackle them.

- We do not have the luxury of being single issue communities anymore.

- You cannot just care about nuclear nonproliferation, the promotion of nuclear power, nuclear waste, security, safety, or kilowatt hour price. You need to care about all of these issues. And you need to be able to find the balance that addresses concerns and recognizes the continuing strategic and geopolitical importance of nuclear power and commerce.

- To effectively operate in this new environment, it will require: (1) new policies; (2) new partnerships; and (3) the recognition of new realities.

- Let me first address the **New Realities** –I consider these to be the top 7

- (1) Demands posed by global climate change and low carbon energy needs
  - C02 emissions rose 2% in 2017 – the first increase in two years. The headline of a November 2017 New York Times economic columnists' story was "Wind and Solar Advance, but Carbon Refuses to Retreat." This is not good news. It is clear that for all the talk, agreements and fighting over climate change, at the moment there is no plausible path forward to the Paris Climate objective of limiting global temperature increases to 2 degrees C. The slow decline of existing nuclear reactors and the uncertain future of the next generation of technologies has a major impact in this area as they are significant zero carbon energy sources. Something big has to change in the climate debate and part of that is accepting nuclear power as a necessary component of the technology solution set.

- (2) Threats posed by disruptive emerging technologies and non-state actors - requiring continuing excellence and improvement in nuclear governance
  - The cyber challenge is growing globally and evolving as it does. Recent reporting indicates that a crippling cyber-attack on the U.S. could justify a nuclear weapons response. That story may not be correct, but it clearly is an indication of the ratcheting up of the seriousness of the stakes posed by cyber challenges.
  - Artificial intelligence is: (a) not going to be government controlled in democratic nations and mostly will be in the hands of the private sector; (b) will be primarily government controlled in authoritarian nations and used to advance their political and strategic objectives; and (c) as a result of A and B is going to require a lot more thought about how we deal with this technology, its interfaces, and its challenges for nuclear infrastructure and operations
  - Material science advances and 3D printing pose new control and nonproliferation challenges. Some we understand better than others.
  - Terrorists are clearly interested in nuclear materials and facilities, and we had 4 heads of state summits to address this global challenge. Progress was made but there is certainly more to be done.

- (3) Geopolitical challenges
  - Russia and China are aggressive, state-backed international competitors that link nuclear commerce directly to their global political ambitions. I will speak in more detail about this issue.

- (4) Inexperienced newcomer nuclear nations in dangerous neighborhoods
  - While Northeast Asia will see the largest number of new reactors built in the 21st century, led by China, there is going to be nuclear growth in the Middle East and possibly in South East Asia and Africa. In many nations contemplating nuclear power,

the educational, regulatory, and training systems are in need of significant strengthening. We need to collectively ensure that nuclear newcomers are very well prepared to safely and securely operate their nuclear infrastructure, which may include a mix of large LWRs and smaller advanced types.

- (5) Regulatory systems that have not adequately evolved to meet the safety and security needs of advanced reactor technologies
    - The current regulatory systems were built to manage large light-water reactors, not small reactors using coolants other than water. Considerable work is being done to adapt, but it needs to move quickly. Also, whoever controls the advanced reactor market likely will control the regulatory system.

- (6) Elimination of electricity inequality as power and reliability demands grow around the globe
    - There are currently 1.2 billion people globally without access to reliable electricity. That is number is going to decline as the century proceeds. Electricity is the backbone of economic advancement. And, electricity growth must provide for clean air and public health.

- (7) The potential for Geo-Engineering without international control
    - There is the potential for a geo-engineering response to a failure to limit greenhouse gasses by countries with the technological capacity to act on this option. There is little in place in the international system to stop any nation from acting on geoengineering if climate change poses a direct threat to their national security and stability – including the food supply. The international security implications of unilateral actions in this area can be globally profound and create significant security and economic uncertainties. This is an issue that requires a lot more attention.

- All of these issues are individually important, but they also are all interrelated and need to be treated collectively.

- Now let me turn to **New Policies,** with a focus on nuclear geopolitics **–**

- The question that is rising in importance is who is going to supply the next wave of nuclear power – LWRs and advanced reactors - and how committed are they to ensuring the highest levels of governance – safety, security and nonproliferation?

- Traditional nuclear suppliers, including the U.S. and its allies, have primarily written the current safety and non-proliferation rules. But, they are in the process of losing ground on nuclear commerce to Russia and soon China. These nuclear ambitions are state backed and are integrated into the strategic and geopolitical objectives of these countries.

- These are very serious issues for the entire global community. Nuclear operation and supply are special responsibilities. If there is an accident or terrorist attack, radiation will not respect borders. Therefore, standards must be strong and responsive to existing challenges and new developments. And suppliers and operators must be responsible. The impacts of TMI, Chernobyl and Fukushima were body blows to the global nuclear industry and public confidence. Another major accident or nuclear terrorist event could be a death knell for the industry.

- I think that the traditional nuclear suppliers, like the U.S., would agree that nuclear safety, security, non-proliferation, and environmental protection are the essential components for the advancement of civil nuclear power.

- But what do Russia and China think?

- Russia is aggressively marketing its nuclear technology abroad. Its Build, Own, Operate and Return of spent fuel is very attractive to newcomer nations. But it is only possible because it is backed by state financing. No private company can afford to offer that deal, as evidenced by the fact that no private company is offering that deal.

- Newcomers dealing with Russia have commented that they would prefer to deal with the U.S. for a variety of reasons including technological superiority, relationship building and regulatory support.

- But, the U.S. is having trouble closing 123 agreements and its nuclear export industry is ailing.

- As a result, China is poised to become the Amazon.com of nuclear commerce in this century.

- Eight years from now, by 2026, China is projected to overtake the United States as the world's top nuclear power generating nation – making it the largest global nuclear operator and market. But initially, also a leading nuclear nation with the least cumulative number of years of experience compared to other major nations.

- Along with its domestic expansion—20 reactors under construction and 40 more planned – China is seeking to build nuclear plants in emerging economy nations and long-standing nuclear states.

- It also is working hard on advanced reactor concepts, including a high temperature gas reactor that may lead the pack in the race for commercialization. And, China has shown that

it will not play by the rules in attempting to capture this market, as it has been credibly accused of spying to gain an edge.

- One of our key allies – South Korea – has emerged as an important nuclear supplier, but at present there seems to be a weak political commitment in that country to strengthening its global position as a civil nuclear operator and exporter.

- Limiting or eliminating the export role of South Korea - one of the U.S.' critical and responsible partners in the civil nuclear field - will have significant political, economic, climate and international security implications.

- In the face of these new geopolitical realities, the U.S. is not facing the choice of whether to lead or follow. Its choice is to lead or cede – as in cede the international nuclear playing field to Russia and China.

- If the U.S. does not rapidly and actively reinvigorate its global civil nuclear strategy and become a stronger player in the export market, it will still be left with the responsibility and the bill for managing the consequences. Let me offer three examples – Iraq, North Korea and Iran. In one way or another, all three of those nuclear programs have cost the U.S. a fortune to date – and the U.S. was not the original suppliers of the technology for any of them.

- Part of the answer to this situation is that there needs to be much better leadership and strategic thinking at the federal level in the U.S. At the moment, we have outsourced a significant component of our civil nuclear strategy to state legislatures and governors. State capitols, as a general rule, focus on the price of electricity and jobs, not the geostrategic value of the nuclear assets in their states.

- But they should because nuclear geopolitics are as important – if not more so – than kilowatt hour electricity prices for this country.

- There needs to be a clear recognition of the significant implications for the country of continued technical superiority in the nuclear area and its corollary implications for the domestic economy, workforce and employment, environmental objectives, and global nuclear safety, security, and nonproliferation standards. This is the package that matters.

- I worry about the nuclear geopolitics gap that is emerging between the U.S., and Russia and China. They are thinking strategically about their global interests and relationships. They are backing their efforts with government support for nuclear power projects. We do not seem to be thinking strategically and are asking private companies to compete with their own resources on a severely tilted playing field.

- Finally, let me talk about **New Partnerships** – which are the necessary foundation for future progress

- I do think that there is a silver lining in the difficult situation that we are now facing because it is clear that the parties that care about climate, clean air, the future of nuclear power, geopolitics, and nuclear security and nonproliferation need to find a way to work together.

- I have been calling this a "break the mold" partnership that can guide the next generation of nuclear power. It is potentially very powerful.

- This partnership is based on the premise that no single entity has all the answers or controls all the levers that are necessary to advance progress. However, they have common interests that weren't obvious in the 20th century or were buried under the pro- and anti-nuclear battle lines. Together they can assess the landscape and formulate balanced, realistic, and effective responses. This approach serves climate, energy and global security objectives.

- My organization and the Nuclear Energy Institute have helped to crack the old mold by creating the Global Nexus Initiative which is looking at the intersection of climate change, nuclear power and global security. Its working group include a wide swath of expertise.

- We intend to further build on this foundation by addressing the need for proliferation resistance and security in advanced reactors and addressing the geopolitical challenges.

- There also are some important environmental and energy organizations that are hammering away at the old mold by supporting next generation reactors as a response to the climate challenge. They understand that security, governance and geopolitics are part of that package.

- Aligning the critical sectors – civil society, a socially responsible nuclear industry, committed governments and international institutions, and others — will be an extremely potent force for developing and implementing innovative nuclear policies.

- A "break the mold" partnership – as a function of its diversity - can serve as a credible voice on complex nuclear issues, generate high-level attention to challenges, and provide a platform for creative and effective problem solving.

- It is what is needed to guide the next phase of nuclear power in the right direction.