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## **A Global View of the Nuclear Industry in 2022: The Need for Collaboration**

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The start of a new year is always accompanied by reflections on the past year and projections and resolutions for the coming year. As we look to 2022 for the global nuclear industry, what does this new year hold?

First, the world continues to be a very complicated place. Whether it is the omicron variant of COVID-19, the situation in Ukraine, the U.S.-China rivalry, an attempted resolution of Iran's nuclear program, inflationary signals, or Europe's continued challenges with its energy markets, the world tends not to disappoint in terms of the challenges we face. As the nuclear industry navigates this complicated space, both private and public actors need to consider the interplay between world events and commercial considerations, all within a necessary moment of self-awareness that developing and deploying nuclear power projects is an inherently complicated business.

Second, when we look back at 2021 and this first month of 2022, several items (*and by no means a complete list, noting, too, that it excludes a series of negative events*<sup>1</sup>) are noteworthy:

- COP26 in Scotland reinforced the message that climate change is a global issue that requires a multi-layered set of actions and solutions;
- Nuclear energy came out of COP26 reasonably well;
- Meeting global climate reduction targets continues to be challenging, with progress disappointing, if not alarming;<sup>2</sup>
- As of the date of this article, the European Union is very close to including nuclear energy in its taxonomy for environmentally sustainable economic activities;<sup>3</sup>
- The hydrogen economy is at the forefront of thinking of many governments and companies;<sup>4</sup>
- Coming out of the Moon visit to Washington, DC in May 2021, the United States and Korea have committed to working together *"to develop cooperation in overseas nuclear markets, including joint participation in nuclear power plant projects, while ensuring the highest standards of international nuclear safety, security, and nonproliferation are maintained."*<sup>5</sup>
- Japan has committed to boost nuclear technological development with the United States;<sup>6</sup>
- Canada continues to be a center of SMR activity, noting the recent decision by

Ontario Power Generation to move forward with GEH's BWRX300 at the Darlington site, as further reinforced by existing collaboration between the NRC and CNSC on SMR technologies;<sup>7</sup>

- Bruce Power issued a green bond (oversubscribed) as part of its green financing framework to support the needs of its operating units;<sup>8</sup>
- NuScale Power announced major plans in Romania<sup>8</sup> and in respect of a business combination with a special acquisition corporation;<sup>10</sup>
- The U.S. Department of Energy has issued a Request for Information on plans to create a new program to assure the availability of high-assay low-enriched uranium (HALEU) fuel;<sup>11</sup>
- The United Kingdom has set out a new financing model for nuclear projects, known as the Regulated Asset Base (RAB) model;<sup>12</sup> and
- Last but not least, China connected its first SMR to the grid in Shandong province.<sup>13</sup>

Further, when we focus on U.S.-Korean relations, the following are noteworthy developments at the corporate level, in addition to the Moon-Biden meeting in May 2021:

- NuScale's strategic relationships with Doosan Heavy Industries and Construction, GS Energy North America Investments, and Samsung C&T Corporation;
- Holtec's strategic relationship with Hyundai Engineering & Construction;
- X-Energy's collaboration with Doosan Heavy Industries and Construction; and
- USNC's collaborations with Hyundai Engineering and with KAERI.

All of this is, of course, juxtaposed with the competition between the AP1000 and the APR1400 in the Czech Republic and, potentially, Poland and Saudi Arabia.

## **SO, WHAT DO WE CONCLUDE FROM ALL OF "THIS"?**

First, there are a lot of opportunities in reality. These opportunities exist at both the large reactor level (Poland, Romania, Czech Republic, United Kingdom, Saudi Arabia, India, Ukraine) and the small reactor level (U.S., Canada, United Kingdom, Poland, Romania, Bulgaria, Estonia). In short, there is more than enough work to go around for companies within the OECD.<sup>14</sup>

Second, a lot of opportunities exist in theory. Any rudimentary analysis of the world's clean energy needs leads to the inescapable conclusion that nuclear energy needs to play a key role in the decarbonization / net zero effort. No longer can public opinion be used as an excuse for lack of progress on nuclear energy. However, turning theory into reality is where the rubber hits the road. It turns on three very simple principles: (a) project delivery; (b) project viability/financeability; (c) national readiness.

- **Project Delivery** (and transition): Newfound enthusiasm for nuclear energy comes, first and foremost, from the need to decarbonize multiple sectors of the global economy – and this decarbonization is not just for electricity generation; it covers industrial processes, the move to the hydrogen economy, and the need to address the combined challenges of development and water scarcity. Nevertheless, unless the nuclear industry can deliver projects on time and on budget, this moment of opportunity might pass it by. In particular, SMRs are at a critical moment, as this technology class makes the move from technology development to project delivery. Having a licensed technology is not enough. Having a demonstration project is not enough. What is needed is for all project elements to coalesce around particular SMR technologies. Those vendors that can assemble the necessary teaming partners – from EPC contractors, supply chain vendors, and fuel suppliers (think HALEU) to operators, all within a streamlined regulatory framework, resulting in a financeable package that is deliverable AT VOLUME in the near term – will be the ones that succeed.
- **Project Viability** (Financeability): Reactor technology alone is not an answer. What

becomes critical is structuring a viable project that promotes financeability. In order to deliver on the promise of decarbonization, an extraordinary number of nuclear power projects must be delivered, and that can only happen if massive amounts of capital—both public and private—are mobilized to support these projects. Multiple elements must come together to result in a financeable project—ESG<sup>15</sup> treatment / clean energy taxonomy will certainly create potential opportunities for financing sources—but the inherent economics (to include electricity market and offtake structures) will drive financing considerations. Significant capital is “out there;” the key is to attract it to nuclear power projects, whether large or small, and smart capital only flows to good projects. This **capital mobilization** will be critical for nuclear power in the coming years. Such capital mobilization can be reinforced by strong and continued messaging at the national government level that nuclear energy fits within clean taxonomy / ESG standards.

- **Country Readiness:** The theoretical market for nuclear power is meaningless and overplayed. What really matters is whether projects are “real.” In addition to the elements already discussed in this article, “real” is a function of the jurisdiction within which the project is located, and that jurisdiction will be judged by the readiness of its nuclear infrastructure. If the country is not ready, as measured by the IAEA Milestones,<sup>16</sup> the project will not proceed, and it certainly will not be financed. The UAE’s remarkable success must, nevertheless, be judged by noting that Unit 1 at Barakah reached commercial operation just inside of the IAEA’s projected 10-15 year period that is envisioned by the IAEA Milestones. In order for nuclear power to be a meaningful player in the global decarbonization effort, the harsh reality is that these projects need to “go faster.” Going faster requires new thinking, harmonization, and standardization, as well as getting newcomer countries moving faster in the development process. Such an effort will require collaboration at both the government and industry/corporate levels to promote more efficient ways of building nuclear power programs and delivering nuclear power projects, particularly with respect to SMRs, which can be of particular utility in the Developing World.

Third, continued leadership is needed by OECD nuclear vendor countries. This leadership must occur as several levels. COP26 and the EU debate on taxonomy stand as examples of the necessary (and contentious) messaging that must occur in order for nuclear energy to reach its deployment potential. Absolute recognition of nuclear energy’s role in the climate imperative will certainly assist with the structuring and financing of nuclear power projects.

In addition, material assistance is needed to support newcomer countries. This assistance involves nuclear infrastructure development, as well as export credit finance at the project level. Vendor countries, whether individually or in collaboration, can support this **market creation** function, all while promoting the high technical standards and principles (safety, security, safeguards) that distinguish OECD-led offerings in the nuclear sector.

## **SO, WHAT NOW?**

The decarbonization message is based on a “***we’re all in this together***” mentality, combined with a call for the Developed World to lead the charge for decarbonization. The nuclear sector is no different. The only way for nuclear power to realize its rightful place in the decarbonization effort is for the OECD vendor countries and their constituent companies to come together to develop nuclear power programs, deliver nuclear power projects, provide the necessary funding and financing to make that all happen, support newcomer countries in their nuclear infrastructure efforts, and find ways to harmonize and standardize (regulatory, design, and deal documentation) to support rapid technological deployment. There is evidence of collaboration already happening at multiple levels; however, more is needed, and it is needed immediately, especially given the competitive challenges coming from Russia and China.

Collaboration can occur in many ways, but it is often most effective when countries and companies do what they do best, building on each other’s strengths for mutual benefit. Significant opportunities exist; one example is the case of the U.S. and Korea. The U.S. has global reach and influence – a unique geopolitical influence. The United States’ historical leadership in the civilian nuclear sector remains in both the technological /

research and regulatory areas. The success of Korea, both domestically and in the UAE, manifests most significantly in its supply chain for critical components and its project delivery / construction expertise. Both countries have active export credit agencies, and both have a wealth of experience to share with newcomer countries that are looking to start nuclear power programs and structure nuclear power projects.

Thus, within these complementary and overlapping skills sets, it only seems natural that greater collaboration occurs. After all, if the nuclear sector figures out new ways for on time / on budget delivery and can structure financeable projects, the global opportunities are so great that reasonable and forward-thinking minds should be able to find a way to make collaboration work, both at the industry and government levels. With such collaboration, market share can be increased, successful alternatives to Russian and Chinese offerings from state owned entities can be fashioned, and new pathways for the rapid (and harmonized/standardized) and responsible deployment of new, essential nuclear technologies can be fashioned expeditiously through the combined leadership of aligned countries, all in an effort to decarbonize.

<sup>1</sup>Notably, for example, the situation at Taishan; the continued delays at OL3, Flamanville, Hinkley Point C, and Vogtle; and the shutdown of 3 more German reactors.

<sup>2</sup>[https://www.ft.com/content/9a11b08c-4fb3-49ec-8939-9d853745bfce?](https://www.ft.com/content/9a11b08c-4fb3-49ec-8939-9d853745bfce?emailId=61110e13f75a0620004fea367&segmentId=3d08be62-315f-7330-5bbd-af33dc531acb;https://rhg.com/research/preliminary-us-emissions-;2021/?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosmarkets&stream=business;https://www.iea.org/news/coal-power-s-sharp-rebound-is-taking-it-to-a-new-record-in-2021-threatening-net-zero-goals?utm_source=SendGrid&utm_medium=Email&utm_campaign=IEA+newsletters)

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<sup>3</sup>[https://www.world-nuclear-news.org/Articles/Nuclear-and-gas-criteria-set-for-inclusion-in-EU-t.](https://www.world-nuclear-news.org/Articles/Nuclear-and-gas-criteria-set-for-inclusion-in-EU-t)

<sup>4</sup>For example: [https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/environment/hydrogen/NRCan\\_Hydrogen-Strategy-Canada-na-en-v3.pdf](https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/environment/hydrogen/NRCan_Hydrogen-Strategy-Canada-na-en-v3.pdf); <https://www.gov.uk/government/publications/uk-hydrogen-strategy>.

<sup>5</sup><https://www.whitehouse.gov/briefing-room/statements-releases/2021/05/21/u-s-rok-leaders-joint-statement/>.

<sup>6</sup><https://english.kyodonews.net/news/2022/01/e4c44701daea-japan-vows-to-boost-nuclear-tech-development-in-energy-talks-with-us.html>.

<sup>7</sup>[https://www.world-nuclear-news.org/Articles/Regulators-complete-first-licensing-cooperation.](https://www.world-nuclear-news.org/Articles/Regulators-complete-first-licensing-cooperation)

<sup>8</sup><https://www.brucepower.com/2021/11/22/bruce-power-announces-500-million-issuance-of-first-green-bond-globally-for-nuclear-power/>.

<sup>9</sup>[https://www.world-nuclear-news.org/Articles/NuScale-SMR-planned-for-Romania.](https://www.world-nuclear-news.org/Articles/NuScale-SMR-planned-for-Romania)

<sup>10</sup><https://www.forbes.com/sites/jamesconca/2021/12/17/nuscale-nuclear-developer-goes-public-with-a-spac-but-nrc-is-still-a-drag/?sh=4ea232e42c0d>.

<sup>11</sup>[https://www.world-nuclear-news.org/Articles/USA-builds-HALEU-supply-chain.](https://www.world-nuclear-news.org/Articles/USA-builds-HALEU-supply-chain)

<sup>12</sup>[https://www.world-nuclear-news.org/Articles/UK-government-adopts-new-financing-model-for-nucle.](https://www.world-nuclear-news.org/Articles/UK-government-adopts-new-financing-model-for-nucle)

<sup>13</sup><https://www.bloomberg.com/news/articles/2021-12-21/new-reactor-spotlights-china-s-push-to-lead-way-in-nuclear-power?sref=JE4vldm>.

<sup>14</sup>Organization for Economic Cooperation and Development. The emphasis of this article is on OECD countries, given geopolitical rivalries with vendors from both Russia and China, who are formidable competitors at multiple levels.

<sup>15</sup>Environmental, Social, and Governance.

<sup>16</sup>[https://www.iaea.org/publications/10873/milestones-in-the-development-of-a-national-infrastructure-for-nuclear-power.](https://www.iaea.org/publications/10873/milestones-in-the-development-of-a-national-infrastructure-for-nuclear-power)

<sup>17</sup>By example, the numbers just for the European Union are staggering: <https://www.bnnbloomberg-ca.cdn.ampproject.org/c/s/www.bnnbloomberg.ca/new-eu-nuclear-plants-need-568-billion-investment-breton-says-1.1705151.amp.html>.

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