



A Vision for International Partnerships in Global Nuclear Power

Matching Russia's Nuclear Playbook in the Middle East

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By Alan Ahn

Russian civil nuclear exports have raised eyebrows worldwide, particularly in the Middle East where acute fears of weapons proliferation have lingered. Yet emulating aspects of Russia's comprehensive export packages—including spent fuel take-back—may be a prudent option for the U.S. from both a nonproliferation and commercial standpoint. However desirable it may be to replicate features of the Russian deal, the U.S. will find it challenging to do so, at least for the foreseeable future, without close international cooperation. By further leveraging international partnerships, the U.S. can not only advance its competitive position and nonproliferation interests, but also establish a framework for enhancing its voice and credibility in shaping a safer, more secure future for global nuclear power.

Russia and the budding Middle East civil nuclear market. The recent history of U.S. nuclear energy engagement with the Middle East has generally been marked by adversity and misadventure. In a region where it confronts heavy foreign competition, the U.S. has encountered difficulties in concluding bilateral nuclear cooperation agreements (or 123 Agreements), necessary for major sales of nuclear hardware and fuel abroad. 123 Agreement discussions with Jordan and Saudi Arabia have been delayed for years as a result of contentious negotiations, precluding greater U.S. participation in those markets and improving prospects for alternative vendors. Even where the U.S. has concluded 123 Agreements—Turkey, Egypt, and the UAE—decisions were made to contract with non-U.S. bidders for their initial projects. Such developments serve as evidence of an ongoing and momentous trend—international civil nuclear transactions increasingly lie outside the purview of the United States.

Two of the countries with which the U.S. completed 123s—Turkey and Egypt—ultimately opted to partner with Russia, which appears well-situated to reap the greatest rewards from the virtual lack of a U.S. nuclear energy presence in the region and [emerge as the Middle East's predominant supplier of nuclear technologies](#). Russian civil nuclear exports,

as they do not contain U.S. technology or components, would neither require a 123 Agreement nor be subject to U.S. export controls. Thus, Riyadh's 2017 announcement to launch a tender for its first commercial units and growing interest in nuclear energy by neighboring countries have intensified apprehension in Washington surrounding the availability of acquisition pathways not legally accountable to U.S. authority.

U.S. anxieties over Russia's nuclear power exports to the Middle East extend beyond perceptions of Moscow's geopolitical designs in this critical sphere; expressions of unease have long surrounded the operational and sales practices of the Russian nuclear enterprise. Lessons learned from the Fukushima accident, for instance, highlighted the absence of institutional separation between nuclear regulator and promoter in Russia, aggravating doubts about the safety of an industry still evocative of Chernobyl. Given the region's rapidly evolving security dynamics, greater attention has been devoted to Russia's comparative lenience on security and nonproliferation conditions of supply, consistent with Rosatom Deputy Director General Kirill Komarov's [memorable statement](#): "There is no country in which we will not be interested to build a plant." Considering the Middle East's complex fissures and the prevalence of entities not presumed to be subject to conventional notions of deterrence, Russian nuclear technology sales in this realm—both past and anticipated—have raised significant U.S. national security concerns.

Replicating Russian take-back? For all of the alarm generated by Russian nuclear commerce in the Middle East, Russia has generally been lauded for its marketing of spent fuel take-back services, which—if implemented properly—are widely considered a boon for global nonproliferation. Not only does take-back remove a potential source of sensitive material in client states, it also alleviates the burden of instituting national nuclear waste management programs, an attractive selling point for many prospective buyers. Case in point, Bangladeshi officials cited the provision of spent fuel take-back as the primary determinant in selecting Russia to build the country's first-ever nuclear power plant—Saiful Hoque, Dhaka's ambassador to Moscow, [stated in 2013](#): "We chose Russia because they will take back the spent fuel—*no other country has agreed to do that.*"

In the Middle East, take-back guarantees have been written into Russian agreements with Jordan, Turkey, and Iran; these provisions, in addition to assuaging—at least in part—external reservations regarding the growth of nuclear energy regionally, have been instrumental in building Russia's formidable competitive position in this market. Russian commitments to shoulder the responsibility of managing spent fuel on behalf of its patrons exemplify Russia's approach to nuclear transactions—it provides the total suite of essential services and effectively assumes all risks associated with undertaking a nuclear energy program, including financing, operations, and all stages of the nuclear fuel cycle.

For the U.S., the imperatives for matching Russian take-back arrangements are arguably strongest in the Middle East: take-back would, in theory, concurrently allay proliferation concerns and bolster U.S. export competitiveness, two objectives that some [recent media reports](#) have depicted as mutually exclusive in the context of U.S. commercial nuclear aspirations in Saudi Arabia. Despite its theoretical merits, taking back spent fuel from other countries is practically beyond the realm of possibility for the U.S., which has yet to achieve full clarity on the long-term management of its own domestic stockpile of commercial spent nuclear fuel. The Trump administration had [allocated funds to resume licensing activities](#) for the Yucca Mountain Nuclear Waste Repository in its 2017 budget request, though the program remains mired in political controversy and uncertainty in

appropriations.

In a notional U.S. take-back scheme, Yucca Mountain—if restarted and operating—would presumably be the final destination for any spent fuel from abroad. Among the many legal and political obstacles affecting the receipt of foreign spent fuel is the [statutory capacity limit of 70,000 metric tons](#) set on Yucca Mountain, which is grossly inadequate to contain U.S. domestic inventories of spent fuel, especially considering the present pace of accumulation. Even if the statutory limit were to be lifted—this would require identification of a second repository site, of which there is no guarantee—there is no assurance that an expanded Yucca could accommodate both national and international spent fuel. If a U.S. take-back program were to materialize, repository capacity would be at a premium.

Leveraging international partnerships. The hurdles to developing a take-back capability might more easily be overcome collectively—between the U.S. and its international partners—than by the U.S. alone. For example, similar to the U.S., the Republic of Korea (ROK, or South Korea) has experienced recurring political difficulties with repository siting and spent fuel management. This fact has led both countries to officially discuss and cooperate on the shared problem of spent fuel. The 2015 renewal of the U.S.-Korea 123 Agreement mandated the creation of the U.S.-ROK High Level Bilateral Commission (HLBC), initiating a formal channel of communication on [collaboration on spent fuel management](#) through one of the four established working groups.

The U.S. and South Korea also launched the Joint Fuel Cycle Study (JFCS) in 2011, a planned ten-year study that evaluates the technical, economic, and nonproliferation aspects of various spent fuel management options. One of the central functions of the JFCS is to determine the feasibility of recycling spent fuel through pyroprocessing coupled with fast reactors, a technology concept that Korea has pursued in order to maximize repository space that it justifiably anticipates as scarce due to both politics and geography (Korea has a high population density and few suitable geologic formations for a repository). The U.S. and Korea jointly pursue pyroprocessing R&D through the JFCS. Furthermore, Korea Atomic Energy Research Institute (KAERI) and Argonne National Laboratory have been cooperating on the development of the [Prototype Generation-IV Sodium-cooled Fast Reactor](#) (PGSFR). Whether such a system is ultimately realized, adopting a comparable approach of enhancing repository efficiency to the maximum extent possible will—considering realities in the U.S. and Korea—likely be necessary to enable spent fuel take-back capabilities on par with Russia's.

Such partnerships between the U.S. and Korea, which may lay the foundation for offering take-back to export markets in the future, represent just a segment of the spectrum of possibilities for U.S.-Korea cooperation. In Korea, the U.S. has a longtime civil nuclear partner that has developed a strong presence in the Middle East market and could act as a strategic hedge against Russia's regional ambitions. Although Russia has certainly received the lion's share of attention for its nuclear deals in the Middle East overall, the region's most heralded nuclear energy foothold arguably belongs to Korea: the Barakah Nuclear Energy Plant in the UAE. Barakah stands as an anomaly amongst many of the world's nuclear new build projects in that it is reportedly being [constructed on-time and on-budget](#).

According to the analyses of leading experts representing the full spectrum of views on

the matter,^[i] Korea is considered the front-runner to win the Saudi deal. On top of its world-class nuclear industrial and manufacturing capabilities (the country stands out among the world's nuclear energy nations in achieving [historical cost reductions](#) in plant construction), Korea possesses unique attributes that make it an attractive supplier to regional markets, including experience with construction in arid environments through its work in the UAE. The U.S. could leverage Korea's special inroads in the Middle East, perhaps through closer coordination or alignment between U.S. and Korean industry, to further its own nonproliferation and commercial interests in the region. Collaborating on spent fuel take-back from third-country markets could be another potential area for bilateral cooperation.

Pragmatically speaking, if the principal objective is being able to offer and ultimately fulfill take-back assurances to international nuclear markets, then enlisting the aid of additional countries may be crucial, possibly in a more inclusive multilateral scheme.

Deriving lessons. The U.S. and Korea are officially competitors as far as the Saudi tender is concerned, and Russia's prospects for winning the Saudi deal may very well be undermined by its ties with Iran. However, taking a broader, longer-term perspective, the Middle East is too important in terms of both future commercial opportunities and national security interests for the U.S. and Korea not to at least coordinate, if not fully cooperate on a range of services—such as take-back—which would provide both competitive advantages and nonproliferation benefits. Considering the competition (i.e. Russia and China), such international collaboration should not be overlooked. The Middle East may be a preview of how competition plays out in other regions, such as Africa and Southeast Asia, where nuclear power is projected to expand.

Even though spent fuel take-back appears to have no direct bearing on what most consider to be the preponderant source of proliferation concern in the Middle East—the development and spread of uranium enrichment—the findings of a [2007 joint workshop](#) between the U.S. National Academies and the Russian Academy of Sciences highlighted the effectiveness of take-back in incentivizing countries to refrain from pursuing sensitive fuel cycle technologies. The workshop report stated that "assured return of spent nuclear fuel could provide a much more powerful incentive for countries to rely on international nuclear fuel supply than would assured supply of fresh fuel, because assured take-back could mean that countries would not need to incur the cost and uncertainty of trying to establish their own repositories for spent nuclear fuel or nuclear waste."

The workshop's conclusions on the efficacy of take-back arrangements underscore an important truth: while [popular and mainstream narratives](#) of U.S.-Saudi discussions on civil nuclear cooperation portray any deviation from a policy of zero enrichment as deliberate adulteration of sacrosanct U.S. nonproliferation principles, U.S. struggles in negotiating greater constraints on Saudi fuel cycle aspirations are, to a larger extent, the consequence of atrophied U.S. civil nuclear capabilities. U.S. bargaining power to press other nations for restrictions on enrichment and reprocessing (ENR) is materially compromised by its own lack of ENR capacity and inability to definitively resolve domestic spent fuel challenges.

This state of affairs is compounded by the emergence of increasingly assertive competitors capable of providing an exhaustive bundle of technology, services, and the entirety of activities that encompass the nuclear fuel cycle from cradle to grave, including

enrichment and spent fuel reprocessing. Although U.S. nuclear policy can no longer be formed in a vacuum, in dogmatically insisting upon adherence to the "Gold Standard"—requiring U.S. civil nuclear partners to formally renounce ENR development—without leverage backed by capability, the U.S. is pursuing a strategy built on the antiquated assumption that no other strategic actors exist. This is a situation of which the competition is taking full advantage; with other options available for nuclear energy newcomers, U.S. failure to conclude bilateral nuclear cooperation agreements because of overly stringent nonproliferation conditions ironically neuters the nonproliferation value of these instruments.

Proposals for future action. U.S. nuclear thinking must be updated not only to reflect the existence of able competitors, but also of potential partners. While the current administration fully supports the nuclear industry and appears keen on revitalizing U.S. civil nuclear capabilities and infrastructure, this will unavoidably be a long-term and costly undertaking—a fiscally conservative government may be loathe to allocate the funding necessary for such an endeavor. Even if the required budgetary resources were secured, there is no guarantee that the U.S. can recapture the dominant global position it held during the halcyon days of Atoms for Peace. In the upcoming years and probably decades needed to restore and rebuild the U.S. nuclear manufacturing base and supply chain to world-class form, Saudi Arabia may unveil additional project tenders and other aspirants will almost certainly initiate their own programs to meet their surging power demands in a carbon-constrained world. While the U.S. remains in a suboptimal competitive position, Russia and China will seize such opportunities as they appear.

In order to match and compete with the all-inclusive deals offered by the state-backed, vertically-integrated competition, forging deep international partnerships is likely the most viable option in the short and intermediate term, and surely more cost-effective than venturing alone. A wide range of capabilities, not entirely possessed by a single country (outside of Russia and China), will need to be consolidated. One possible combination—financing from the UAE, technology and capacity building from the U.S., engineering and construction from Korea, and fuel cycle services from Canada—could conceivably produce a comprehensive package approximating those offered by Russia or China. Although there are numerous permutations involving any number of different countries and specializations, only the U.S. possesses the worldwide clout to assemble such a diverse coalition and thus, it must assume a leadership role in any such effort.

This amalgamation of capabilities could not only serve new entrants and export destinations, but also the markets of the countries comprising the coalition, laying the groundwork for internationalizing nuclear energy and the nuclear fuel cycle—an internationalization not realized through the traditional model of ceding national sovereignty for an amorphous global good, but driven by the forces of market competition and the specter of domination by ascendant juggernauts. The U.S., in helping form and then using and relying upon a multilateral system for fuel cycle services, attains both leverage and credibility in encouraging its prospective civil nuclear partners to follow suit. As it stands, the U.S. has neither leverage nor credibility to pursue civil nuclear cooperation of the form that some, including notable members of Congress, espouse.

The steps needed to realistically compete with Russia and China must be taken now. While neither player has achieved an insurmountable position in the global nuclear market—there are doubts about the sustainability of Russia's build-own-operate (BOO)

model arising from a weakened Russian economy; China, notwithstanding the steep trajectory of its current ascent, lags behind in terms of operational experience and remains relatively untested as an exporter—time is the pivotal factor in addressing their shortcomings. As China gains experience and Russia recoups the investments in its completed reactors, enlarging its bandwidth to finance new build projects, the present window of opportunity will steadily close. Time is of the essence—capitalizing on this opportunity will require both swift action and prudent collaboration.

[i] See: Chris Gadowski, "Saudi nuclear: handicapping the vendors," Bloomberg New Energy Finance, March 19, 2018 (for access, contact sales.bnef@bloomberg.net); Henry Sokolski, "5 Myths about Saudi Arabia's Nuclear Program," The National Interest, March 6, 2018, <http://nationalinterest.org/feature/5-myths-about-saudi-arabias-nuclear-program-24771> (last accessed April 3, 2018).

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