

BULLETIN

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United States and the International Nuclear Energy Market

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The United States remains the first-rank player on the international nuclear energy market, although its standing has deteriorated, mainly because of the standstill in the domestic nuclear industry and the emergence of new players. From the point of view of countries pursuing their own nuclear energy programs, cooperation with the U.S. can be particularly advantageous in the area of nuclear regulation and safety. One of the ramifications of advanced cooperation with the American nuclear industry is the need to comply with U.S. regulations governing the transfer of nuclear technology.

Assets. The United States' standing on the international nuclear energy market results from the extent to which U.S. reactors have been deployed worldwide, dating back to the early days of the development of nuclear energy for civilian purposes, i.e., the 1960s and 1970s. According to the Nuclear Energy Institute, technology developed by the leading U.S.-based companies—General Electric and Westinghouse—is currently used in more than 60% of the civilian reactors worldwide. What follows has been the wide application of U.S. nuclear safety standards as well as a certain preference for American nuclear fuel manufacturers. The United States claims a 27% share of the global production of fuel for light-water reactors, by far the most popular reactor type in use. The American dominance remains unmatched because of a surplus of supply to the world market and the high costs associated with the introduction of reactor designs that would run on new types of fuel. Countries whose civil nuclear programs run on U.S. technology tend to conform with or adapt to American patterns for regulation of the nuclear industry since they are the most suitable for the technical solutions developed and perfected in the United States. It grants the U.S. the possibility—via an elaborate system of training and exchange of regulatory experience and best practices—to exert influence upon the content of nuclear-safety standards, especially with respect to the sensitive stages of the nuclear fuel cycle, such as uranium enrichment or the reprocessing of spent fuel.

Limitations and Challenges. The legal framework for the international activities of the U.S. nuclear industry is set by bilateral agreements on nuclear cooperation, the so-called 123 agreements. The United States has entered into 27 such agreements, including with the European Atomic Energy Community (EURATOM), thus covering Poland. In the past few years, delays in the implementation of the 123 agreement with China, the belated conclusion of the agreement with India (signed in 2008), and the absence of an agreement with Vietnam has prevented U.S. companies from engaging in the initial phases of development of the nuclear industry in these countries. Still, even with a 123 agreement in place, room for U.S. vendors to manoeuvre is limited by a complex set of procedures governing such things as exports of reactors or their parts, other nuclear plant components, or transfers of fissile material and nuclear fuel. Details of the foreign ventures of the U.S. nuclear industry is supervised by the Nuclear Regulatory Commission (NRC), which grants licenses for the majority of nuclear equipment transfers and manages initiatives aimed at sharing regulatory know-how. The Department of Energy handles permits for the transfers of technology related to the construction, day-to-day operation or maintenance and repair of nuclear power plants. The circulation of so-called “dual-use goods”, which are fit to be utilized by the nuclear industry, is overseen by the Department of Commerce, which is also responsible for promoting U.S. companies' offers overseas. Such a division of labour between various government agencies reflects the purposes that have been assigned to the international activities of the American nuclear industry by U.S. authorities. On the one hand, the goal is to secure the economic benefits associated with participation in a global market

whose total worth is estimated by the Department of Commerce to be \$750 billion. On the other hand, it is about making sure that the transfer of U.S. civilian nuclear technology—interpreted broadly, and encompassing the body of experience of U.S. regulators and nuclear engineers—will be in keeping with U.S. non-proliferation priorities. American companies openly voice their concerns that overly restrictive or ambiguous regulations of nuclear technology transfers negatively impinge on the timeliness and effectiveness of their participation in foreign tenders.

The international standing of the American nuclear industry is under stress as a result of the virtual stagnation in the construction of new reactors in the U.S. Of 104 commercial reactors in use in the United States, only two have entered service since 1991, compared with 50 in the 1980s. This pause has led to the loss of the ability of the U.S. steel and metallurgical industry to handle some of the more specialized requests of the nuclear industry. On the world market, the vacuum was quickly filled by contractors from China, France, Russia and South Korea, who often deliver vital reactor parts for U.S. vendors. Recent years have seen an increased interest in nuclear energy—between 2007 and 2011 the NRC received applications for 26 new reactors, and despite the accident in Fukushima further applications are expected this year—but a serious build-up of the reactor fleet is questionable for several reasons. First, the so-called nuclear loan guarantees, which are issued by the Department of Energy and intended to serve as the principal instrument for the mitigation of risk associated with the costly investment in the nuclear sector, turned out to be unattainable for most investors. Second, the economic viability of building nuclear power plants is nowhere near that of available alternatives, especially gas- or coal-fired plants. As a result, once currently built reactors go online—a total of four are expected to be ready by 2015-2016—the successful completion of subsequent ones seems unlikely. Last, the commercial application of small modular reactors—cheaper to build and highly economical to operate, and thus regarded by both the Department of Energy and the Department of Commerce as the most promising area for the expansion of the U.S. nuclear industry—is not expected sooner than 2020.

Bureaucratic, legal and industrial hindrances offer a useful explanation for the drop in the U.S. share of the global reactor market. Out of 60 reactors that went online between 1995 and 2009, only 10 were built with the participation of American vendors, chiefly in the Asian market. At the same time, certain locations, such as France, Russia or South Korea were off-limits for U.S. companies because of state monopolies on nuclear technology deliveries. Still, as shown by the example of the United Arab Emirates, American bids to enter local civil nuclear markets are thwarted by more advantageous offers (South Korea in the UAE), thus raising questions about the efficacy of U.S. nuclear diplomacy.

Conclusions for Poland. The U.S. reactor designs listed among the possible picks for the Polish nuclear energy program have not entered service on the American market thus far. U.S. companies rely on the fact that their technology has been picked elsewhere in the world, e.g., the latest Westinghouse design is on schedule to begin operations in China in 2013. American vendors are quite active in Central Europe. General Electric will be the strategic investor and technology provider for a nuclear power plant in Lithuania, Westinghouse is competing for a contract to expand a plant in the Czech Republic and has voiced interest about modernizing or expanding reactor sites in Bulgaria. These cases could be used to gauge the extent to which U.S. companies are willing to use the local industrial, engineering and scientific base. At the same time, there will be limits for such comparisons, not least because of differences in the stages of development of these countries' nuclear programs vis-à-vis Poland, e.g., Westinghouse built inroads into the Czech Republic in the 1990s thanks to its involvement in the modernization of the Czech reactor fleet.

As early as the tender for the delivery of nuclear technology, Poland should consider establishing—in coordination with U.S. authorities and the country's nuclear industry—programs aimed at ensuring compliance with U.S. regulations governing the transfer and sharing of technology, and determine the extent to which these regulations could affect civil nuclear cooperation with other countries. These considerations notwithstanding, Poland should make the most of the U.S. training programs for cadres of its nuclear energy program, especially in the area of nuclear safety, where the U.S. record is particularly extensive.