

**Going Nuclear on Rosatom:
Ending Global Dependence on Putin’s Nuclear Energy Sector
Testimony before the House Committee on Foreign Affairs,
Subcommittee on Europe**

**By David Albright, President,
Institute for Science and International Security
February 15, 2024**

Rosatom, its entities, and its senior personnel should be subjected to far greater sanctions by the United States and its allies. There need to be sanction carveouts or waivers for nuclear reactor safety considerations, operating nuclear reactors, and for other Rosatom customers as they wind down existing contracts. However, the status quo is not sustainable. It leaves the United States and its allies vulnerable to political and economic pressure by Rosatom and its owner Russia, with the constant threat that this Putin-controlled entity could cut off energy supplies. This already happened to Germany in September 2022 when Gazprom, another Putin-controlled entity, cut off natural gas supplies to Germany as a result of a clash over Putin’s invasion of Ukraine. Only a mild winter staved off serious and needless suffering by the German people.

Rosatom deserves sanctions today. It is not just a benign commercial nuclear energy supplier. Rosatom has actively participated in the illegal seizure of the Zaporizhzhia nuclear power plant (ZNPP), a seizure causing an increased risk of a major nuclear accident. Rosatom officials are not authorized to operate these reactors. IAEA Director General Raphael Grossi has called this situation “not sustainable” and “risks nuclear safety and security.” Rosatom is also complicit in the human rights violations of Ukrainian plant personnel, violations that include torture.

Rosatom also actively contributes importantly to the production of Russian weapon systems used against Ukraine. A case in point is the participation of one of its subsidiaries in the production of the Shahed 136 kamikaze drone that Russia has used to destroy much of Ukraine’s civilian energy infrastructure and terrorize its civilian population.

Moreover, the case of Rosatom’s supply to Iran of a nuclear power reactor at Bushehr makes clear that Rosatom should not be trusted to provide safe nuclear reactors to developing countries, which lack the necessary infrastructure and safety culture to operate the reactors safely. In the case of Iran, Rosatom provided a reactor with multiple safety deficiencies to a country with a weak infrastructure to support this reactor, all those conditions magnified by the Iranian regime’s self-inflicted isolation. One wonders if Iran’s Bushehr power reactor is safe

enough to operate today, despite years of intensive safety modifications and improvements. A major reactor accident risks spreading radiation over Gulf states after about 12 hours. For countries contemplating or building nuclear power plants for the first time, Rosatom reactors, while economically appealing on the purchasing side, may turn out to be huge economic liabilities on the operational side, effects aggravated enormously in the case of a serious reactor accident.

More sanctions on Rosatom are inevitable

Sanctions on Rosatom flow naturally from the 2022 G7 Leaders' Communique commitment to further reduce reliance on civil nuclear and related goods from Russia, including working to assist countries seeking to diversify their supplies. Subsequent Western action has focused on finding alternatives to Rosatom's supply of nuclear materials and technology, while sanctioning Rosatom subsidiaries and personnel for activities associated with the war in Ukraine. However, treating Rosatom holistically with regards to sanctions will be more effective and is called for.

I would like to present two examples of Rosatom activities in Ukraine and Iran that support both expanding sanctions and displacing Rosatom from the international nuclear market.

Rosatom and the Shahed 136 Kamikaze Drone Attacking Ukraine's Civilian Infrastructure

Russia's brutal use of Shahed 136 kamikaze drones against Ukraine is well known. Less well known is Rosatom's role in helping build them via its subsidiary JSC Umatex at the Alabuga Special Economic Zone (SEZ). Umatex's factory at the SEZ is Alabuga Fiber, and this state-of-the-art plant was constructed in the SEZ at the behest of Rosatom.

Alabuga Fiber is involved in providing carbon fiber to the nearby plant making the Shahed 136 drones. JSC Alabuga, which runs the SEZ, produces the Shahed 136 drones under a contract with the Russian Defense Ministry, with extensive aid from Iran.

Figure 1, from a translated early 2023 JSC Alabuga internal document, shows Umatex's enthusiastic willingness to supply the nearby drone factory with enough carbon fiber, one of the key materials in the Shahed 136 drone's airframe. In early 2023, it was "ready to organize" deliveries of the needed carbon fiber. Other internal Alabuga documents also show Alabuga Fiber's involvement in supplying materials for the Shahed 136 drone.

Alabuga Fiber and Umatex are rightly sanctioned by the United States for supplying carbon fiber to Russia's military industrial complex. However, Rosatom has not been sanctioned for its support of Shahed 136 production or more broadly for its support of Russia's military industrial complex.

Alabuga Outreach to Raw Material Producers for Shahed 136 Production, Translated from an early 2023 Alabuga Presentation

Raw material suppliers				
Name	Company	Revenue, mln/year	Location	Status
Bidirectional carbon fiber	Umatex	938	SEZ Alabuga	Negotiated , ready to organize supplies
	LLC Composite product	714	Moscow	Trial purchase contract for consumables in the process of payment in 1C
Glass cloth	Polotsk Volokno (Belarus);		Polotsk, Belarus	Negotiations were held , production was visited, maximum 10 thousand m2 per month can be supplied
	Steklonite	2 400	Ufa	A sample of EZ 100 fabric was obtained
	TatNeft Fiberglass	2 400	SEZ Alabuga	Project for retrofitting of the plant for producing the necessary fabric for the project Boats in progress
	Makhachkala plant fiberglass	160	Makhachkala	A sample of EZ 100 fabric was obtained
Epoxy binder	Epitale	800	Moscow	TOR for binder sent ; technical documentation for proposed materials received
	Chemex Limited	968	St. Petersburg	Samples were obtained
	OOO Composite product	714	Moscow	Trial purchase contract for consumables in the process of payment in 1C
	ITEKMA	856	Moscow	TOR for binder sent ; technical documentation for proposed materials received
Styrofoam	JSC Polymer Research Institute	1 541	Dzerzhinsk	Technical documentation for the product has been obtained
Aramid honeycomb	Jiaying CMAG Composite Material Co., Ltd,		China	Technical documentation for the product has been obtained
	Metastar	6 000	China	Received a sample from distributors

Figure 1. Translation of a slide in Russian from an internal JSC Alabuga PowerPoint presentation about obtaining the raw material for producing the airframe of the Iranian Shahed 136 Kamikaze drone. The original Russian slide is in Russian. Umatex is listed as ready to deliver bidirectional carbon fiber to the nearby JSC Alabuga Shahed 136 drone production facility.

Alabuga Fiber relies on an adjacent Umatex facility at the SEZ that makes a key precursor material used to manufacture carbon fiber. This facility has experienced production problems, requiring Alabuga Fiber to import large amounts of precursor material from China. These transactions may be carried out in US dollars. Other imports by Alabuga Fiber from China and Turkey may also involve US dollar transactions.

Iran's Bushehr Nuclear Power Reactor is a Reason to Avoid Rosatom Reactors

Iran's Bushehr nuclear power reactor stands out as an example of the type of risks Rosatom and its predecessor organizations have undertaken to obtain lucrative contracts in countries not prepared, institutionally or culturally, to deal with the complex array of issues involved in operating reactors safely, preventing nuclear reactor accidents, and preparing to deal with them if they occur. Russia's nuclear export enterprises also showed their willingness in their hunt for contracts to ignore the Iranian regime's secret drive for nuclear weapons and its hostility to the United States and its allies, in Russia's search for contracts. Moreover, Iran remains the only state with nuclear power plants that has not signed onto the Nuclear Safety Convention, a status Rosatom tolerates.

When Iran started the Bushehr reactor in May 2011, it was not in a position to operate a nuclear power reactor safely. Rosatom and its predecessors failed to prepare Iran for operating the reactor safely or provide a reactor system able to adequately meet safety criteria.

The dire safety deficiencies at the Bushehr reactor were recognized early, although not publicized. Two bodies conduct safety evaluations of nuclear power reactors, the IAEA's Operational Safety Review Team (OSART) and the World Association of Nuclear Operators (WANO). WANO has conducted several peer reviews of the Iran National Power Production and Development Company (NPPD) and its subsidiary the Bushehr Nuclear Power Plant, focused on the safety of the nuclear reactor.

In a November 2011 assessment, WANO recognized a host of safety problems in the Bushehr reactor during what it called its "pre-startup" inspection. In an anomaly, this assessment occurred two months after Bushehr was connected to the nation's electrical grid, rather than before operation began as required by standard practice, an action that reveals Rosatom's lack of commitment to safety first.

The safety of this reactor is critical. A severe accident with the release of radiation will not only affect Iran but also much of the Gulf region. Figure 2 is from Russian 2016 calculation, positing a hypothetical release on July 12, 2016 at 9:00 Moscow time. The hypothetical radioactive plume crosses southern Iran, reaching the UAE in 11 hours after the initial release and Oman in 13 hours.

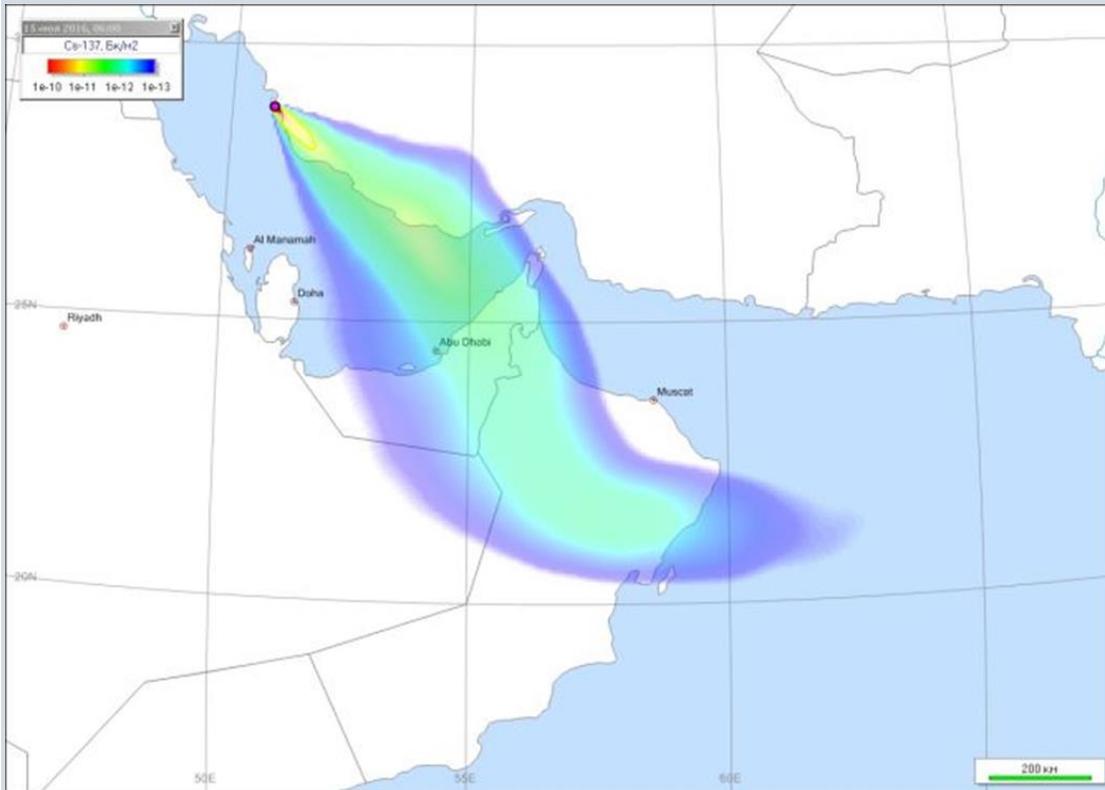
Many of the safety problems identified by WANO in 2011 continued to be identified in a repeat audit in 2013, with resolution of other safety issues between the audits occurring slowly or incompletely. In a four-level WANO scale, where level A is the highest and D the lowest, the 2014 audit assigned only one A, 13 B's and 6 C's, an overall poor performance. No D's were assigned, but this level, according to the 2014 audit, appears to be assigned only if the plant refuses to make any earlier recommended changes or it shows an unwillingness to do so.

In advance of a 2017 IAEA OSART mission to Bushehr, a Rosatom subsidiary assessed the level of operational safety of Bushehr and recommended improvements. It concluded: "Without systematic and painstaking work to eliminate non-conformities, it is possible to receive a significant number of recommendations and suggestions from the experts of the IAEA OSART mission, which will significantly exceed similar values at other NPPs in the world." Nonetheless, the OSART mission identified hundreds of individual safety lapses and made dozens of suggestions and recommendations for improvements, with six overarching or significant recommendations.

“Assessment of the possibility of transboundary transport of a radioactive cloud in the event of a radiation accident at the Bushehr nuclear power plant”

Emergency Practice

Hypothetical release of 1 Bq of Cesium 137 on July 12, 2016 at 9:00 MSC.
Original in Russian; translation by DeepL.



The results of the calculation show the expected transboundary transfer to the nearby states:

Country	Day, month, year, time (MSC) The front of the radioactive cloud reaches the border of the State
Iran	12.07.2016 0900
United Arab Emirates	13.07.2016 0800
Oman	13.07.2016 1300
Saudi Arabia	14.07.2016 1100

Figure 2. Excerpt, translated from Russian of a document reporting on an “emergency practice” of the release of cesium 137 from the Bushehr nuclear power reactor.

In 2017, after “mid-life” repairs, the Bushehr managing director gave a list to Rosatom Service, Rosatom’s subsidiary offering services and supplies for supporting nuclear reactors’ operation and maintenance, of the many defects related to temperature measuring equipment in reactor coolant pumps. In the letter, he also felt it necessary to mention that considering the large number of existing defects, there was also the possibility for the discovery of more defects.

Incident or event reports from 2017 into 2020 discuss multiple cases of unsatisfactory repairs by Rosatom Service or its contractors and design errors or deficiencies in reactor or reactor-related components. Although there were many human errors by plant personnel in the event reports, a surprising number of design defects were also reported.

Two related safety issues consistently set aside by the Bushehr operators were emergency preparedness and severe accident management. The 2017 OSART mission identified this issue as one of its six significant recommendations. In 2022, according to a WANO follow-up assessment, this area still received a level B assignment in the four-level ranking system, where level B was defined in this review as indicating that progress was improving but more needed to be done. A WANO assessment assigned this area a level C in 2017, which was stated to be the case when little or no progress had been made in this area.

What remained undone in 2022? Severe accident management guides were not implemented, the plant expecting two more years to receive and implement them. Mobile emergency response equipment had finally been delivered but was not being used or, in some cases, it was used for non-emergency applications. In addition, some of the emergency equipment originally installed was inadequate, and the problem of the depressurization of the containment vessel in case of severe accident had not been solved.

Another safety issue involves problems Bushehr encountered in ensuring a reliable, stable off-site source of electricity. In 2016, the Bushehr plant manager wrote to the Managing Director of Iran’s electricity network to express concern over five disruptions and fires that had occurred in 2014 and 2016 that cut off external electric lines, activating the reactor site’s emergency operation, leading to disrupted reactor operation. The plant manager finished his letter by writing (translated from Persian): “Such events, while increasing the risk of severe damage to the vital equipment of the power plant, including the turbogenerator and the unit's main pumps, and the long-term shutdown of the power plant, potentially threaten the safe operation of the power plant. Therefore, to prevent the repetition of these events, it should be put on the agenda as appropriate to please order as soon as possible to improve and modernize the networks connected to the power plant.” He was emphasizing the necessity of a reliable and stable off-site electricity supply for the nuclear power plant to ensure safe operation, a point often illustrated by the multiple disruptions or destruction of the Zaporizhzhia nuclear power reactors’ external electrical lines following military attacks. Such a supply is particularly critical when the reactor core is shut down, ensuring pumps keep cooling the nuclear core to

prevent a meltdown and providing ongoing cooling of the spent fuel pond to prevent radioactive releases there. It is unclear why the plant waited to raise this problem until 2016. However, it shows a lax attitude to solving critical safety deficiencies and a lack of domestic infrastructure to incorporate a nuclear power reactor.

The Bushehr reactor is built in an earthquake zone and is reportedly built to withstand a magnitude 7 earthquake while being operated, although one of the safety areas is considering beyond design basis. Nonetheless, in November 2017, the plant logged in a WANO event tabulation a 7.4 magnitude earthquake 970 kilometers distant from the reactor

An April 2022 WANO corporate pre-visit review of the Iran Nuclear Power Production and Development Co sheds additional insights into the more current problems at the Bushehr reactor:

- In terms of improving and sustaining continuously high levels of safe reliable operation and emergency response, significant improvements are required in areas including improving the quality of maintenance, improving the quality of contractor services, and supplying spare parts.
- NPPD has contracted with Roseneergoatom, a subsidiary of Rosatom, for developing manuals for severe accident management but the deadline is not clear (as of April 2022).
- Ongoing problems coordinating with the electric grid operator continue.
- The main causes of events at the reactor are insufficient quality of documentation, equipment failures, and human factors.
- Joint efforts of the BNNP and the Bushehr plant are needed to improve the reliability of the equipment.
- A problem remains that staffing for the current and the new nuclear power reactors is the responsibility of the operating Bushehr reactor, a problem aggravated by the retirement of personnel experienced in commissioning and operating the Bushehr reactor.

In summary, the Bushehr reactor has suffered from numerous safety problems, well documented by OSART missions and WANO reports. However, some of the problems have resulted from Russia's (and Rosatom's) less than acceptable designs and parts. This has necessitated years of expensive safety upgrades, replacement of faulty parts, creation of new operating manuals and changes in operation, and creation of safety and emergency procedures to bring Bushehr up to something approaching modern safety standards; yet after more than ten years since the reactor started, the task remained incomplete.

Countries in the process of buying their first nuclear power reactors need to think carefully about relying on Rosatom. Based on the experience of Iran, Rosatom should not be the choice.

While Russia can handle severe nuclear reactor accidents itself, many of the developing countries contemplating nuclear power reactors cannot. And Rosatom seeks customers without proper regard for a country's stability or its ability to ensure the safety and security of the reactor. As a result, countries should choose a reactor vendor that has incorporated the latest and most reliable safety designs into its reactors and will work with the state and international entities before and while the reactor is being built to ensure adequate supporting infrastructure and emergency response capabilities to ensure safe reactor operation and effective emergency responses.

Moving from a warning to sanctioning Rosatom may seem harsh, even with the necessary and appropriate waivers included, which should include nuclear reactor safety, operating nuclear reactors, and a winddown period for other existing foreign contracts with Rosatom. However, combined with Rosatom's role in illegally occupying the Zaporizhzhia nuclear power plant and contributing importantly to outfitting Russia's illegal military attacks against Ukraine, sanctioning Rosatom, its subsidiaries, and its key personnel today is deserved and necessary.