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Issue paper

Are safety upgrades and lifetime extensions synonyms in the Ukrainian nuclear sector?

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Name
Olexi Pasyuk

Position
Central Asia coordinator

Contact details
pasyuk@bankwatch.org

In November 2010 the EBRD, together with the European Union, announced its involvement in the EUR 1.2 billion Nuclear Power Plant (NPP) safety upgrade project for Ukraine. In May 2011 the consultancy POYRY, along with the Ukrainian state power company Energoatom, announced a first round of scoping consultations as required by the EBRD Environmental Policy.

While this initiative appears on the surface positive and particularly timely, especially as the world's attention is focused on issues of nuclear safety, further evaluation of the proposed project raises more questions than answers. The most immediate issue of concern is that this upgrade project makes sense only in the context of NPP lifetime extensions, otherwise there is no reason to finance costly upgrades for facilities that will anyway close in a couple of years. And though Energoatom clearly links these safety upgrades with lifetime extensions, the EBRD is reticent to do so.

Lifetime extensions of ageing reactors

Today Ukraine operates four NPPs - Zaporizhzhya, Rivne, South Ukraine and Khmelnitsky NPP - with fifteen nuclear reactors, of which thirteen are type VVER-1000 and two VVER-440. Beginning in 2010, almost every year one nuclear unit in Ukraine will come to the end of its designed lifetime, meaning that most Ukrainian reactors will have reached the end of their lifetime by 2020 (see annex 1). The decommissioning of NPPs requires significant financial resources, and the Ukrainian government has not yet properly saved for decommissioning. This is one reason the nuclear industry and the Ministry of Energy view the extension of old NPP lifetimes as a solution.

In October 2010 the Ukrainian Ministry of Energy approved the "complex (consolidated) nuclear power plants safety upgrade programme in Ukraine" (SUP) for development by Energoatom. According to an Energoatom press release "SUP determines the amount of safety improvement measures which should be implemented at each nuclear power unit. Given that the implementation of safety improvement measures is indispensable for the lifetime extension of operating nuclear reactors, the implementation of SUP measures is also particularly relevant for the implementation of tasks defined by the Energy Strategy of Ukraine till 2030[1]." In other words the safety upgrades enable the lifetime extensions of the units.

Meanwhile EBRD management continues to ignore that public money will be used to prolong the lifetime of outdated nuclear units in Ukraine. "If the operator considers applying for extension of licenses beyond their current deadlines he (sic) will have to do so in line with Ukrainian rules and procedures. The bank will not support any activities in this process." The EBRD must be aware though that the safety upgrade programme under consideration prioritises the upgrade of expiring reactors:

"The implementation of the planned SUP activities depends on their priority: The activities of higher priority must be done before activities with a lower priority. Priority I activities are planned for implementing, as a rule, before the end of the reactor's designed life term. Priority II activities are planned as part of the lifetime extension preparatory programme with the possible completion of the project af-

ter the end of operation... When designing step-by-step schedules in order to optimise the allocation of financial and technical burden of SUP implementation, the programme's activities will be primarily implemented by Energoatom at power units RNPP-1, 2, SUNPP-1, 2, ZNPP-1, that should be prepared for the extension of operation earlier than other units[3]."

As Rivne-1 has already started to operate beyond its foreseen lifetime and the other plants prioritised here are also those whose planned lifetime soon expires, it cannot be denied that the safety upgrades directly enable the lifetime extensions.

EBRD involvement in financing for the SUP will also endorse the decision to prolong operations at the Rivne-1 and 2 reactors by facilitating compliance with nuclear regulatory conditionalities. Board Resolution 15 of the State Nuclear Regulatory Committee of Ukraine from December 10, 2010 clearly states that a 20 years lifetime extension for Rivne-1 and 2 is conditional on the following provision:

"Establish the following obligatory conditions for the operation of units Units 1 and 2 of Rivne NPP over designed term - Implementation of measures envisaged by "Complex (Consolidated) Nuclear Power Plants Safety Upgrade Programme in Ukraine... and implement[ion] other necessary measures to improve safety on the analysis of operating experience of power, the world's other nuclear power plant operating experience and results through security[4]."

Unsafe transitions

Experience so far with EBRD involvement for nuclear safety in Ukraine is mixed. In 2004 the EBRD approved financing for post-construction upgrades of the K2/R4 reactors. At that time the EBRD promised that one of the outcomes of the project would be Energoatom's ability to mobilise financing for safety measures at other reactors: "The safety level of 13 operating VVER units will be upgraded over the next six to seven years using K2 and R4 as a benchmark. The safety upgrades of these units will be performed in accordance with the Upgrade Package developed by Ukrainian and Western experts, reviewed and agreed by Riskaudit and approved by the [State Nuclear Regulatory Committee of Ukraine].The financial provisions for the Upgrade Package will be annually reflected in the [electricity] tariff."

Yet seven years, later most of those upgrades are still pending and Energoatom has yet to raise money in Ukraine for these upgrades. This is a clear sign that the EBRD has failed in one of the most crucial aspects of its involvement in nuclear safety.

The EBRD has agreed with Energoatom to conduct an environmental analysis following Ukrainian standards for environmental impact assessments (not required by national legislation). However the first scoping meeting raised many questions about the purpose of the study and the process itself. The organisers said that the main purpose of the process is to inform public, yet there was no scope of the environmental assessment presented at the scoping meeting. In the discussion, however, it appeared that the scoping was prepared long ago and approved by Ukrainian officials, so no principle changes are expected.

A bigger question is about the purpose of the analysis itself. It was suggested that the analysis should consider the strategic environmental assessment approach from European SEA Directive 2001/42/EC. However the consultant claimed that no strategic alternatives would be examined, as closure of the units was the original design. The whole exercise is quite murky.

Recommendations

- Should the EBRD proceed with the Ukrainian NPP safety upgrade project, the loan agreements should clearly specify that reactor lifetime must not be extended beyond the originally projected period. Therefore nuclear units whose lifetime already expired (e.g. Rivne-1) and those that will expire in the near future should be excluded from the project.
- The focus of EU and international financial institution support in the Ukrainian nuclear sector should centre solely on safety issues that have till now been overlooked, like the preparation for closure and decommission of old reactors approaching the end of their lifetime and the long-term management of spent nuclear fuel. The EBRD should more actively pursue Energoatom to ensure that its tariffs will accumulate sufficient funds for the management of spent fuel and radioactive waste and decommission of reactors after closure.

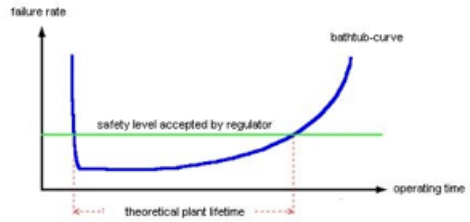
Notes

1. http://www.energoatom.kiev.ua/ua/news/nngc?_m=pubs&_t=rec&_c=view&id=27974
2. EBRD's response to NECU letter: http://www.necu.org.ua/wp-content/uploads/0110-denysenko.pdf
3. Complex (Consolidated) Nuclear Power Plants Safety Upgrade Programme in Ukraine, page 14.
4. http://www.snrc.gov.ua/nuclear/uk/publish/article/139708

Annex 1 Overview of reactors facing expiration of their designed lifetime

Reactor name	Type	Installed capacity MW	Expiry of designed lifetime
Rivne 1	VVER-440/213	420	2010
Rivne 2	VVER-440/213	415	2011
South Ukrainian1	VVER-1000/302	1000	2012
Zaporizska 1	VVER-1000/320	1000	2014
South Ukrainian 2	VVER-1000/338	1000	2015
Zaporizska 2	VVER-1000/320	1000	2015
Rivne 3	VVER-1000/320	1000	2016
Zaporizska 3	VVER-1000/320	1000	2016
Khmelnitsky 1	VVER-1000/320	1000	2017
Zaporizska 4	VVER-1000/320	1000	2017
South Ukrainian 3	VVER-1000/320	1000	2019
Zaporizska 5	VVER-1000/320	1000	2019
Zaporizska 6	VVER-1000/320	1000	2025
Rivne 4	VVER-1000/320	1000	2034
Khmelnitsky 2	VVER-1000/320	1000	2034

Annex 2. Problems caused by NPP lifetime extensions beyond designed period.



When a reactor has been operational for more than 20 years, the risk of accidents involving radioactive emissions significantly increases with every year of operation.

As a result of ageing of NPPs, the occurrence of fails such as minor emissions and leaks, appearance of cracks, and short circuits increases. An increase in the number of fails is caused by the gradual decline in the strength of reactor materials and other related factors. This is the experience of lifetime extension projects implemented in the US, Europe and Russia.