

Expert comments on the evaluation report
of the German Federal Government
***“Evaluation of the continued operation of nuclear power plants
on account of the war in Ukraine”***
by Kerntechnik Deutschland e.V. (KernD)

Introduction and procedure adopted for the comments

The arguments and statements of the German Federal Government regarding the continued operation of the remaining German nuclear power plants still in operation, which were published in the joint evaluation report of the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection and the German Federal Ministry for Economic Affairs and Climate Action of March 8, 2022 are commented on and assessed below by the Kerntechnik Deutschland e.V. industrial association (KernD).

The individual sections of the government paper are commented on here, in each case by stating the original section number and the section heading, whereby a summary of the main content with the government’s important assessments and positions (in italics) is followed by a detailed comment (identified as such).

1. Current situation

The Federal Government states that in Germany at present and up to December 31, 2022, the Isar 2, Emsland and Neckarwestheim 2 nuclear power plants are in operation, with a total capacity of 4300 MW (gross). Most recently, the Brokdorf, Grohnde and Gundremmingen C nuclear power plants were shut down on December 31, 2021; these plants together could provide around 4200 MW of power (gross).

Given a possible situation where there is a shortage of gas in connection with the war in Ukraine, the Government has addressed the question of whether the nuclear power plants could or should continue to be used.

Comment KernD:

What is important, but not considered in the Federal Government paper, is the fact that the value of the power generation by the nuclear power plants must be rated more highly than power generation from volatile sources (e.g. wind and solar) because of the availability round the clock (apart from the times needed for refueling and maintenance). Wind power and solar power cannot provide the base load, whereas

power from nuclear energy and coal can. This is a very important criterion especially when carrying out assessments in crisis situations. In 2021, the six nuclear power plants generated a total of 69.1 billion kilowatt hours of power (gross), which corresponded to 11.9 percent of the German gross power generation.

2. Legal and approval situation

The Federal Government writes that legal measures would be required to continue operating the plants shut down on December 31, 2021; these measures would equate to a “new approval” to “EPR-standard”, which would not be achievable for technical and scientific reasons and which would therefore be revoked by the Federal Constitutional Court.

Comment KernD:

As long as the approval for the demolition has not been received by the nuclear power plants, the existing operating license applies exclusively. Under the Atomic Energy Act, only the authorization to operate for power generation expires with the deadlines stipulated in §7 Para. 1a, the operating license in contrast is not affected. From the point of view of administrative law, the licenses are actually still valid, since the Act does not suspend them. It should be sufficient to change the final dates of the above-mentioned §7 1a and refrain from specifying the remaining quantities of power generation allowances. The basis for approvals in Germany is incidentally not the “EPR-standard” cited, but the “Safety Requirements for Nuclear Power Plants (Sicherheitsanforderungen an Kernkraftwerke, (SiAnf)”. The SiAnf state that the basis for significant nuclear amendment procedures and the Periodic Safety Review (Periodische Sicherheitsüberprüfung, PSÜ) is the requirement in respect of damage prevention according to current scientific and technical knowledge. This does not allow one to deduce that an “EPR-standard”, whatever it may be, must be met to continue operating the plants shut down on December 31, 2021. The legal basis on which the new “EPR-standards” are to be applied is completely unclear at present.

In its evaluation report, the Federal Government asserts that a legal obstacle for the continued operation of the plants still in operation is that, according to the judgement of the European Court of Justice, a statutory extension of the operating periods of nuclear power plants would require a cross-border Environmental Impact Assessment (EIA). A further obstacle stated is the requirement that the legislative authority undertakes a new, comprehensive assessment of the risks and the balancing of legally protected interests with regard to nuclear energy in amending the corresponding assessment after the accident at Fukushima.

Comment KernD:

The issue with the revocation of the calendrical deadline and possibly dispensing with

the limit on the amount of power is the restoration of the original licensing status. The plants could thus continue to be operated. Safety analyses over and above the periodic measures would not have to be undertaken until 2028 and 2029 (on reaching the so-called “design lifetime” of 40 years). The statement of the Federal Government on the EIA is not correct and is based on a misinterpretation of the relevant ECJ ruling. The ECJ had to rule firstly on an extension of the operating period by 10 years – which is currently not the issue here – and secondly prescribed an important exception for the case that the member state proves that energy security would otherwise be threatened. Precisely such a threat is now the reason why analyses regarding the continued operation of nuclear power plants are currently being carried out at all.

The assessment of the risk and the balancing of legally protected interests after the Fukushima accident was based on purely political considerations. From a technical point of view, the robustness analyses carried out after Fukushima showed that the German facilities are among the most robust in the world. Additional improvements were made as part of the post-Fukushima measures. These ensure for example that the power supply for the core cooling is guaranteed for at least 7 days in the event of longer-term power outages. Moreover, it must be stated that nuclear power plants with a newer design are among the best protected industrial plants of all because of their solid reinforced concrete structure.

3. Safety consideration

In the evaluation report, the Federal Government points out that for the plants currently operating, a special approval in the Atomic Energy Act was used regarding the PSÜ which is required every ten years, and the PSÜ due at the end of 2019 was therefore not carried out. The Federal Government states that undetected safety deficits in accordance with the SiAnf of 2012 (revised 2015) and therefore investment requirements in the safety technology cannot be ruled out.

Comment KernD:

No PSÜ on the basis of SiAnf has yet been carried out for the so-called Konvoi facilities which are still operating. A PSÜ on the basis of these SiAnf has already been carried out for older plants (e.g. Brokdorf and Gundremmingen C), however.

No appreciable deficits were identified here. Even if the PSÜ were to be updated for the Konvoi facilities taking account of the requirements from the SiAnf, it is not expected there would be any appreciable deficits. For this reason, it is not expected that this will result in any longer phases of shutdown for upgrades.

After the PSÜ 2009 for the Konvoi facilities had been completed, the Fukushima accident led to the special situation in respect of measures to upgrade technical safety in the decade which followed and these measures were concluded after robustness analyses and stress tests in around 2014. The relevant safety improvements are therefore already implemented and a staggered approach can be adopted for any safety review now commencing. The important results for the overview of the safety

level can be submitted within one year. The nuclear industry is available to support the execution of these analyses and the implementation of any measures which result.

The lessons learned from other national and international incidents have continued to be evaluated and, where necessary, appropriate optimizations already carried out. The nuclear rules and regulations updated in 2015 require damage prevention measures according to current scientific and technical knowledge. As has been shown above, these requirements are fulfilled for the plants under discussion here. The SiAnf also contain demands placed on the control of beyond-design-basis incidents on the so-called safety level 4. These requirements are fulfilled as well. This means that a safety level similar to that of the EPR is achieved.

In the view of KernD, the nuclear power plants can continue to operate at the existing safety level without any tradeoffs.

4. Technical situation

In its evaluation report, the Federal Government writes that, on the basis of a definition it uses of the so-called stretch-out operation as a temporal delay of power production by suspending operation, a possible continued operation of the nuclear power plants would not generate additional power until the end of March 2023. Moreover, the Federal Government asserts that fresh fuel assemblies could not be delivered until fall 2023 at the earliest and also lists the supply with spare parts as an obstacle to continued operation.

Comment KernD:

The statement regarding stretch-out operation and additional power generation is not correct. The nuclear power plants, especially the Isar 2 nuclear power plant, could generate additional power for several months in spring 2023 with the existing fueling in a stretch-out operation. Stretch-out operation means the utilization of nuclear fuel beyond the planned end of the cycle and hence the generation of additional power. In addition, if there is a surplus of electricity (solar, wind) especially during the summer months of 2022, fuel could be saved by reducing the power output of the nuclear power plants and then thus creating additional capacities for a possibly critical phase in winter 2022/2023.

The nuclear industry in Europe feels obliged to support the electricity supply in Europe. Accordingly, the sector is giving priority to the procurement of fuel assemblies to extend the operation of German nuclear power plants. This would make it possible to supply a certain quantity of fuel assemblies within a significantly shorter lead time while satisfying the current safety requirements, to have them available in good time for a short cycle in winter 2022/2023, for example. With this strategy, it would be possible to produce significant additional power as early as winter 2022/2023. The larger refueling quantities mentioned in the evaluation report of the Federal Government would then only be required later, in summer 2023. This would then allow

normal periods for the procurement of fuel assemblies. The core loadings stated would then be carried out in compliance with the current safety requirements and framework conditions. This would obviate the need for additional inspection and approval work above and beyond what is usual.

It can therefore be stated with certainty that the procurement of fuel assemblies will not become a bottleneck if procurement measures are started now, and an uninterrupted operation of the nuclear power plants can be maintained. Fuel assembly manufacture does not depend on a supply from Russia, because suitable alternatives are available. These are already being used. A possible embargo on supplies from Russia will therefore not have any negative impacts here.

On the subject of spare parts, it has to be stated that the spare parts management of the German operators is sufficient for continued operation. Spare parts have not been destroyed, but have been taken by other customers of the VGB Powertech service association and are therefore still available when required. The capability to repair control platforms and control systems is also guaranteed, e.g. by German operators themselves with their own workshops and by external providers. Incidentally, this is not a new situation for German operators.

The supply chains of the relevant nuclear engineering companies in Germany and Europe are still in place to satisfy the requirements of the German facilities. It should be pointed out that nuclear power plants similar in design to German facilities have been built by the former Kraftwerk Union (KWU) around the globe (Angra 2, Trillo, Gösgen, Borssele). Discontinued products or a shrinking supplier base can be compensated by targeted obsolescence management, such as by qualifying new suppliers, providing qualification support to those from related sectors, approval of new products and upgrades. These solutions would be available for the continued operation of German plants as well.

5. Staff

The evaluation report of the Federal Government states that no staff resources were available for continued operation and new staff require several years of specialist training.

Comment KernD:

For short-term or medium-term continued operation, the operators are able to cover the staff resources in principle. In addition, staff from other sites could be retrained within one year.

Any operating staff possibly required in addition could be trained by manufacturing companies as well. Capacities, which were created for the initial staff training for new-build facilities, are available for this.

The international activities of companies for new builds and service mean that suitable service staff are available who can also be used for the continued operation of German facilities.

For continued operation over a *longer* timespan – which is currently not under discussion – it would indeed be necessary to provide several years of specialist training for additional staff in the tried and tested framework, although this could also be facilitated again under appropriate conditions.

6. Economic viability and risk spreading

The evaluation report of the Federal Government gives the aforementioned costs for possible upgrade measures and spare parts and also the costs for the disposal of additional radioactive residual materials and the liability insurance which has to be extended as further obstacles to continued operation.

Comment KernD:

From KernD's point of view, no appreciable additional costs per operating year result from the amount of radioactive residual materials and the liability insurance compared to the present, economical operation.

7. Energy economics and climate policy assessment

Here the Federal Government claims that no additional power could be provided by the nuclear power plants in the first quarter of 2023, since this would first have had to be saved in the summer and generated by other facilities such as gas and coal-fired power plants. The Federal Government concludes from this that the additional use of coal and lignite power plants could also cover possible bottlenecks resulting from a situation when a shortage of gas occurs in the upcoming winter.

Comment KernD:

Additional power can be generated as of January 2023 by additional stretch-out operation. In the context of the load-following operation, nuclear fuel could be specifically saved in 2022 during periods of high solar and wind power generation. This would not lead to additional gas consumption in summer 2022. With the stretch-out operation and the fuel saved by load-following operation, additional power could be generated in winter 2022/2023 and the grids thus stabilized in the event that the supply of solar and wind power fluctuates. In this critical period, power generation could save a significant quantity of gas, something which is not possible at all for the decentralized and so-called protected consumers in the heat market.

When power from coal-fired power plants is replaced by nuclear power generation, a significant contribution to the avoidance of additional CO2 emissions is made.

In addition, there is a need to clarify whether the capacities of the coal-fired power plants alone are sufficient to stabilize the grid when there are no coal imports from Russia and at the same time no gas-fired power plants are available either. Moreover, it is also important to note that the coal-power capacities south of the River Main are not large, and that the large high-voltage DC transmission lines which are to be built as part of the phase-out of nuclear energy and which could transmit power or in this case coal power temporarily on a large scale from western and eastern Germany to southern Germany, will not be available for several years yet.

8. Conclusion

In its conclusion, the Federal Government takes the view that the continued operation of the nuclear power plants in Germany cannot be recommended even given the current political crisis and the crisis in the gas supply in particular. This is because of the above-mentioned arguments and assumptions regarding the situation in respect of licensing legislation, the supposed shortage of additional power because of its interpretation of the concept of stretch-out operation, the assumptions on the supply with new fuel assemblies, hypotheses on the comprehensive upgrades required, a declared possible applicability of a non-existing EPR standard, assumed staffing bottlenecks for the operating staff at the power plants and at the regulatory authorities, as well as the raising of doubt under constitutional law about the legislative authority's amended decision on the balancing of legally protected interests, and misgivings about sights being lowered in respect of the safety philosophy, when weighing up the benefits and risks.

The Federal Government furthermore argues that the additional expenditure means their operation would have to continue not only for two or three years but for at least three to five years in order to economically justify the expenditure. The Federal Government alleges here that "until 2028, other options are available to guarantee the electricity supply is sufficient despite any situation with a shortage of gas."

Conclusion by KernD:

As explained above, the KernD industry association considers the arguments and assumptions of the Federal Government, which form the basis of the assessment that the continued operation of nuclear power plants cannot be recommended in the current situation, do not support this conclusion. Quite the opposite, the nuclear power plants with their ability to generate the power for the base load could provide a crucial contribution to energy security in a situation where there is a shortage of gas or even a general energy economics emergency in Germany, without incurring disproportionate expenditure. The facilities, the staff, the know-how, the supply chains – in short, the complete technical and economic nuclear system – are all still available after all, unlike LNG terminals, additional power and gas lines, many additional renewable energy generation facilities or provider contracts for very large quantities

of liquid gas from the highly competitive global market. And not least, the nuclear power plants would provide low-emission power in continued operation, which would stabilize the trend on the electricity market with low and stable generation costs.

For nuclear energy to make an effective contribution to avoiding or preventing a potentially huge energy crisis, there have to be fast political strategic decisions, because if political hesitancy and a sudden crises in the energy sector, which the Federal Government apparently does not expect at the moment, were to coincide, it may possibly be too late for effective measures for the nuclear power plants. The length of time nuclear power can make a useful additional contribution depends on the general geopolitical and energy-economics situation. The possibility of continued operation in the medium term instead of only the short term is certainly not a disadvantage or even an obstacle, since the European Commission recently announced it was aiming not to be dependent on Russia for fossil fuels by 2027 by means of its REPowerEU initiative, for example.

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