Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

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12-point plan to complete the nuclear phase-out – the position of the Federal Environment Ministry

After the Fukushima nuclear disaster on 11 March 2011, Germany took the decision, with all political parties in agreement, to phase out commercial use of nuclear power by the end of 2022 at the latest. This decision will minimise the ultimately unmanageable risks nuclear power poses to people and the environment in Germany. When the last nuclear power plants in Germany are switched off at the end of 2022, we will achieve a historic goal – also thanks to many thousands of people who have worked tirelessly over decades for the nuclear phase-out and the energy transition.

The Federal Environment Ministry (BMU) sees its work for the nuclear phase-out as far from complete. On the contrary, we are pressing full steam ahead because the nuclear phase-out will not yet be complete at the end of 2022. Nuclear power continues to pose risks that call for further resolute action in Germany, in Europe and globally.

The risks of nuclear energy cannot be contained by borders. In light of this, the further use of nuclear power abroad is not in Germany's interests, not to mention new, state-subsidised nuclear power plants. Many people are concerned about the operation of old nuclear power plants in neighbouring countries, particularly in Germany's border regions. A number of these power plants are due for extensions of their operating lives that in some cases go long past their original licenses. The Federal Environment Ministry shares the worries of the public and is working to ensure that its interests are protected.

In the climate debate, the Federal Environment Ministry has a clear position: nuclear power is not a solution to combat climate change, and for good reason. Its share of worldwide primary energy consumption[1] does not even amount to 5%. For this reason alone, it cannot make a substantial contribution to the achievement of climate goals. And nuclear energy always involves residual risk. It is too expensive, particularly in comparison to renewable

1 Cf. Key World Energy Statistics 2020 (data for 2018) from the International Energy Agency (IEA).

energy, and it blocks the expansion of renewable energy. Nuclear power is unwieldly and does not fit well with a decentralised renewable energy system. High-level radioactive waste disposal is also a problem that no country in the world has solved. The follow-up costs are immense and will burden generations to come. Trends show us that nuclear power is yesterday's technology; the future belongs to renewable energies.

On the tenth anniversary of the disaster in Fukushima, Federal Environment Minister Svenja Schulze presented her position on completing the nuclear phase-out. The goal: more safety, more renewable energy and a complete exit from nuclear power. The 12-point plan that will guide the work of the Federal Environment Ministry in the coming years is divided into three areas:

A. Complete the nuclear phase-out in Germany: close nuclear supply facilities, make progress on disposal, accelerate the expansion of renewable energy
B. Reduce nuclear risks in Europe, strengthen cooperation
C. Enhance nuclear safety worldwide, retain expertise and provide appropriate information

In detail:

A. Complete the nuclear phase-out in Germany: close nuclear supply facilities, make progress on disposal, accelerate the expansion of renewable energy

Once the use of nuclear power has been phased out, much will remain to be done to close the book for good on nuclear energy.

1. Close the nuclear supply facilities in Lingen and Gronau

The Federal Environment Ministry is of the opinion that Germany's nuclear phase-out is not compatible with the production of fuel elements for nuclear installations in other countries. The ministry is therefore working for the closure of the facilities in Lingen and Gronau, which must be implemented in the next legislative period. According to an expert report commissioned by the BMU, a legally compliant closure would be possible. However, an initiative to this effect from the BMU during this legislative period did not meet with the necessary support in the German government. From the BMU's standpoint, a legal regulation to end nuclear fuel element fabrication in Germany and the operation of the uranium

enrichment facility in Gronau is the right solution to put an end to an untenable situation in which old nuclear power plants located in other countries and close to Germany's border are operated with fuel elements produced in Germany.

2. Accelerate the expansion of renewable energy so that wind and solar power replace nuclear and coal power more quickly

Since the decision to phase out nuclear power after the disaster in Fukushima, the amount of electricity sourced from nuclear and coal-fired power plants in Germany has halved. At the same time, the amount of electricity from renewable energy has doubled. Renewable energies have proven that they can replace the old energy mix of nuclear and coal and that they can represent a sustainable, safe, clean and future-oriented energy supply for an industrialised country like Germany.

The BMU believes that the goal should be to replace all lost generation capacity from conventional sources with renewable energy. This is the only sustainable option. To date, it has been possible to replace the nuclear and significantly reduced coal electricity with the planned amounts of electricity from renewable energy, in accordance with the recommendations of the Commission on Growth, Structural Change and Employment (Kommission “Wachstum, Strukturwandel und Beschäftigung”). Now it is time to take the next logical step and redouble efforts to expand renewable energy by 2030, also in light of the more ambitious EU climate target. This would be a credible and sensible path to our goal of being climate neutral by 2050 in Germany and at EU level.

3. Determined progress on the disposal of high-level nuclear waste with the highest possible level of safety

The solution to the nuclear waste problem is a huge challenge that affects the whole of society. The decision to end the use of nuclear energy paved the way for restarting the site selection process for a final repository. The Repository Site Selection Act (Standortauswahlgesetz) is the legal basis of the search for a repository site for high-level radioactive waste. The procedure is science based, transparent and runs according to previously established criteria. It aims to be participatory, i.e. involving broad participation from the public. The Repository Site Selection Act sets out a number of formats for public participation. We are on the right path with the site selection procedure. We will continue resolutely with our efforts, even though it is a path that is long, demanding and will ultimately cost money. Finding an appropriate site ensuring the highest possible level of safety over a period of one million years for the disposal of high-level radioactive waste is an enormous challenge. There is no simple solution for this type of waste disposal. There are plans for nuclear waste management in other countries, for example in Finland, France and

Switzerland. However, worldwide no final repository for high-level radioactive waste has been put into operation.

With the current status of its site selection process, Germany is further along than many nuclear power countries in managing the nuclear waste problem. The BMU will continue to do everything in its power to ensure that the site selection procedure concludes with a viable result in one decade's time. We owe this not least to the people who now live near storage facilities.

4. Provide more information and enable more public participation

We are blazing a new trail in Germany in selecting a site for a final repository for high-level radioactive waste. Part of this is the planned participatory form of the site selection process, i.e. with broad participation from the public. Public participation is also called for in other projects, e.g. for the licensing of storage sites for high-level radioactive waste, where participation is legally required. Because the operating licenses for storage sites will all expire in succession before an operational final repository is available, a transitional solution must be found with involvement from the public.

The BMU will increase its efforts to provide educational material and information to the public. The BMU provides information about nuclear safety on its website and using many other channels, for example an information portal created together with the federal states, to make it easier for people to access information on nuclear safety. This information is even more important because with the end of the nuclear phase-out in Germany in sight, the problems and risks associated with nuclear energy will are no longer being discussed as intensively as they were a few years ago. On the other side of the debate, advocates of nuclear power are voicing their arguments. They talk up nuclear energy as a "sustainable" low-carbon technology that is necessary to reach the climate goals. New designs like SMRs (small modular reactors) and more advanced reactor lines are being declared inherently (or very nearly) accident proof and controllable. However, the facts speak against these claims. The enormous risks and dangers of nuclear power must be clearly highlighted for new and allegedly new nuclear technologies.

The BMU therefore plans to expand its information offerings. We want to reach more people. These efforts also include providing teachers and pupils with scientifically sound and understandable information.

B. Reduce nuclear risks in Europe, strengthen cooperation

With its phase-out, Germany is joining the EU member states that view nuclear power critically. In fact, half of the EU member states have never relied on nuclear energy. Neighbouring countries like Austria, Luxembourg and Denmark never even entered the field of nuclear power. Others, like Belgium, have also made the decision to phase out nuclear power, with concrete shutdown dates for the reactors in operation. Spain is considering a phase-out. Italy and Lithuania took decisions against a re-entry into nuclear power after the Fukushima disaster. Even the nuclear advocate France intends to reduce nuclear energy's share in the electricity supply to 50% and is planning further shutdowns to follow the shutdown of the Fessenheim nuclear power plant. When the last German nuclear power plants go offline at the end of 2022, less than half of the 27 EU member states will be producing nuclear energy.

5. Close ranks with countries critical of nuclear power

The Federal Environment Ministry will actively work with like-minded European countries to encourage other countries to embark on the nuclear phase-out path. In every individual case, we will also strive to ensure that the goals stipulated in the Euratom Treaty regarding the use of nuclear power are adapted to meet the challenges of the future.

Publicly subsidised new nuclear power plants in the EU are not in Germany's interests and are not aligned with climate action and the energy transition. Nuclear power is no longer economically viable. It is low carbon but not clean and has unavoidable residual risks. The follow-up costs are immense and will burden generations to come. Disposal of nuclear waste is a work-intensive, costly and very lengthy process. In the EU, we have specific common goals to improve energy efficiency and expand renewable energy.

6. Safety Risk of Ageing NPPs: Call against lifetime extensions and call for participation

Every country takes sovereign decisions on its energy supply, and we respect this. The Chernobyl disaster showed very clearly that nuclear accidents can have an impact on people and the environment in distant countries. For this reason, we will continue to work to achieve the highest operational standards for nuclear safety in Europe and internationally.

We are especially concerned about the advanced age of many nuclear reactors that are far beyond their designed operating lifetime, generally of 40 years. In the middle of this decade, over half of the existing nuclear power capacity in the EU will come from plants in long-term operation. Safety measures can only be taken selectively against the aging of nuclear power plants, not comprehensively.. There are technical and economic limits on backfitting – an embrittled reactor pressure vessel, for example, is impossible to replace. The German

government is against extending the operating lives of nuclear power plants for this reason. The Federal Environment Ministry is pursuing strong efforts to create transparency around operating life extensions and to ensure that neighbouring countries have options for participation in the process. At the very least, a transboundary environmental impact assessment (EIA) should be carried out.

Thanks to determined negotiations conducted under the German Council Presidency, in December 2020 an international legally binding guidance on operating lifetime extensions was adopted under the Espoo Convention on transboundary EIAs. The guidance defines the conditions under which an EIA must be considered and carried out. 45 countries are parties to the Espoo Convention. The guidance makes the ruling of the European Court of Justice (ECJ) on lifetime extensions for nuclear power plants a general standard, also with binding character for non-EU countries with ageing nuclear power plants, such as Switzerland, the United Kingdom, Ukraine and Belarus. The ECJ ruling clarifies that there is an obligation to carry out an EIA for operating life extensions under certain conditions.

According to German EIA law, government authorities at the federal state level are the competent authorities in transboundary procedures for foreign nuclear power plants. In future, the BMU intends to provide these authorities with more technical and expert support.

7. No public money for nuclear power plants in the EU and beyond

The Federal Environment Ministry will continue to speak out determinedly against any European funding framework, guidelines or funding instruments that grant eligibility to nuclear power. We are against subsidising nuclear power plants with EU funds and reject any public funding for the development of new nuclear power plants, including in the form of export guarantees.

In the view of the BMU, EU financing should exclusively go to green, safe and sustainable technologies to advance renewable energy, achieve the climate targets and push forward Europe's decarbonisation. The BMU is convinced that nuclear power, among other things, cannot be sustainable in the meaning of the EU taxonomy due to the unresolved nuclear waste issues and other problems. Nuclear power should therefore be categorically excluded by the requirements of the Taxonomy Regulation.

The BMU is committed to ensuring that the interests of the EU member states that have phased out or want to phase out nuclear power are given comprehensive consideration in the ongoing reform of EU state aid.

Nuclear power is not a feasible way to achieve climate objectives, not even as a transitional technology. If the follow-up costs and risks are considered, nuclear power is actually the most expensive option for generating electricity. Renewable energy sources are available as a much cheaper, safer and sustainable option.

New nuclear power plant projects, particularly in many developing countries and emerging economies, would financially burden tight national budgets over decades and lock in resources that are otherwise needed for a future-proof energy supply. In the fight against climate change, there is no time for the lengthy planning and building phases of nuclear power plants, which, with their cooling-water requirements are already not climate resilient. These are just some of the serious disadvantages.

For these reasons, Germany's bilateral development financing through the KfW rules out funding for projects involving the use of nuclear power. The multilateral development banks also do not fund nuclear projects other than decommissioning ones. The BMU will continue working to ensure that development banks continue to deny funding to nuclear energy projects.

8. Nuclear power plants close to borders – strengthen bilateral commissions

The Federal Environment Ministry has set up bilateral nuclear safety commissions with all of Germany's neighbouring countries that operate nuclear power plants, including Belgium, Czechia, France, the Netherlands and Switzerland. These commissions are platforms for regular exchange on questions of nuclear safety and radiation protection topics. Continuous exchange builds trust, which is a crucial basis for effective, neighbourly cooperation. We want to consolidate this cooperation. Above all, we want to continue to look closely at developments and pose critical questions as needed until the topics we have raised are clarified to our satisfaction. We want to expand, intensify and strengthen the work in the bilateral nuclear commissions, especially with a view to the period after the last German nuclear power plant is taken off the grid at the end of 2022.

9. Continue radiological emergency preparedness at a high level after the German phase-out and improve international networking

The Fukushima nuclear disaster in 2011 made it vividly clear that radiological emergency preparedness must be a basic component of national safety architecture in order to respond quickly, competently and effectively to the dangers that can result from the commercial use

of nuclear power. The events in Japan led to a review of the existing structures in Germany and, as a result, to fundamental changes and innovations in emergency preparedness. Following the Fukushima disaster and in response to a BMU initiative, the German government revised the Radiation Protection Act in 2017 to include an updated, comprehensive emergency management system for Germany and its federal states. A Federal Radiological Situation Centre was set up at the Federal Environment Ministry to ensure a coordinated and uniform response to radiological emergencies.

The experience gained from the catastrophe in Japan was a milestone and starting point for considerable improvements to the national and federal state emergency management system. Findings from regular drills and evaluations show clearly that Germany is on solid ground in terms of its ability to respond to radiological emergencies with the establishment of the Radiological Situation Centre and the radiological situation report.

The establishment of the general emergency response plan and the cross-sector specific emergency response plans for Germany and the federal states makes further preparations possible in all essential areas, ensuring a national state of preparedness in the event of a nuclear emergency. We will continuously work on these plans and continue to build on what is already a high level of safety. Even after Germany has phased out the use of nuclear power, there will still be nuclear power plants in operation in Europe and thus the risk of a serious accident with severe impacts on Germany. The BMU is therefore in intensive contact with Germany's neighbours, at bilateral and multilateral level, to coordinate transboundary emergency preparedness planning through strong international cooperation. It is key here that the measures taken to protect the public in the case of an accident are as uniform as possible on both sides of the borders.

C. Enhance nuclear safety worldwide, retain competence and provide proper information

10. Work internationally for high safety standards

Germany is working to ensure that the highest safety standards apply to nuclear power plants around the globe. We will continue to actively engage in relevant European and international bodies, even after the last nuclear power plants in Germany are switched off.

We are continuously following up on the nuclear policy related situation of our neighbours and other countries and contributing our understanding of safety. We do this primarily in specific bilateral channels, but also in the relevant European and international bodies focusing on nuclear safety issues. We respect the fact that responsibility for the safety

assessment of nuclear power plants lies exclusively with the competent national nuclear safety regulator, the only party with access to all the necessary information for a comprehensive safety assessment.

The importance of this kind of involvement is being demonstrated by the most serious nuclear accident since Fukushima, which has yet to be fully clarified despite all efforts. At the end of September 2017, there was a substantial release of the radioactive isotope ruthenium-106. The circumstances and analysis indicate a release location in the southern Ural Mountains. Germany was unmatched in its strong involvement in efforts to clarify the incident. We were also a driving force in the international investigative commission and in international organisations' events on the topic held to make investigative progress. A key lesson from the incident: when the country likely responsible for the occurrence states that it had registered no corresponding release incident in its nuclear facilities, it proves nearly impossible to determine the exact location of the release or its cause. In the view of the BMU, for potential similar incidents in future where there is a lack of clarity around the responsible party and location of a specific release, the international community must be able to react more quickly so that data on measured values and other findings can be exchanged immediately via established information systems.

11. Improve nuclear civil liability - damage prevention and victim protection are our priority

Germany is one of the few countries internationally that attributes unlimited liability to operators of nuclear power plants – i.e. with their total business assets – for damages caused in the event of a nuclear incident. In most other countries with nuclear power plants in operation, operator liability in the event of a nuclear incident is limited to a specific sum. To improve protection for victims, Germany is supporting unlimited operator liability in the framework of existing international agreements.

12. Retain competence and introduce solid facts in the international nuclear debate and with regard to new reactor concepts

Even after the last German nuclear power plant has gone offline, nuclear

safety-oriented skills and young talent development must be retained. The BMU and the Federal Ministry for Economic Affairs and Energy, sharing lead responsibility, have drawn up a federal strategy to this end with participation from the Federal Ministry of Education and Research. The strategy takes into account the future needs of relevant stakeholders (national and federal state licensing and regulatory authorities, Technical Support

Organisations, advisory bodies, operator associations, research institutes, universities, industry). The strategy, adopted by the German Cabinet in August 2020, includes a specific catalogue of measures. These touch on the following areas: training and teaching; continuing education and professional development; research and development; knowledge maintenance, committee work and networks; international networking and transboundary activities; professional outlook and societal recognition.

Competency retention is also important so that Germany can continue to participate at a high level in the international debate on nuclear power and counter the myths that sometimes circulate with verified and current facts. At the moment, concepts such as small modular reactors (SMRs) are being pushed as an allegedly promising option for safe and sustainable energy production in future that is also fair to the coming generations. However, the facts here are much more austere. From a technical standpoint, these concepts are often the equivalent of “old wine in new bottles”, based on approaches that were developed decades ago and eventually abandoned in practice due to serious problems that remain unsolved. Beyond this, the development, construction, operation, decommissioning and waste management of SMRs – in comparison with conventional nuclear power plants – raise many further unresolved issues and risks in the areas of nuclear safety, security and non-proliferation. There is no reliable evidence for the far-reaching safety promises often made with SMRs.

Nuclear waste management remains an open issue also with the use of SMRs. These reactors, which are essentially based on existing nuclear power plant designs, will produce similar amounts of radioactive waste. There is no proof that new reactor designs can significantly reduce the amount of radioactive waste generated. The use of new cooling media such as molten salt or lead could potentially even produce more waste.

In short, SMRs shift the disadvantages of nuclear energy production from (comparatively) few large installations to many small ones. Ultimately, the installations are smaller, but the problems in sum will tend to be larger. SMRs are not a path towards the future – but a step in the wrong direction. For these reasons, we are against these kinds of concepts and do not deem them eligible for funding.

However, there are projects for the potential use of SMRs in Europe and around the world. Therefore, the BMU takes this development seriously and will follow it attentively and with a critical eye