KFK

COMMISSION TO REVIEW THE FINANCING
FOR THE PHASE-OUT OF NUCLEAR ENERGY

Responsibility, Safety and Certainty – A New Consensus on Nuclear Waste Disposal

Final Report of the Commission to Review the Financing for the Phase-out of Nuclear Energy

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25 MAY 2016

Table of Contents

Contents

On October 14, 2015, the Federal Government took a decision in cabinet to set up a commission to review financing for the nuclear energy phase-out (*Kommission zur Überprüfung der Finanzierung des Kernenergieausstiegs*, the "Commission"). The Commission was tasked with drawing up recommendations on how to set up financing for decommissioning and dismantling of nuclear power plants and nuclear waste disposal in such a way that the companies responsible will be financially capable of meeting their obligations arising from nuclear energy operations on a long-term basis.

We hereby submit our final report.

Berlin, April 27, 2016

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1 Task and Motivation

With the consent of all parties represented in the Bundestag, the Federal Republic of Germany resolved to properly end the use of nuclear energy for power generation. The legal framework for the energy transition is provided by the consensus reached on nuclear energy in 2001 and the *Nuclear Power Phase-Out Act* (Atomgesetz, hereinafter: Atomic Energy Act) passed in 2002 and amended in 2011, together with the *Renewable Energy Sources Act* (Erneuerbare-Energien-Gesetz, hereinafter: Renewable Energy Act), the *Energy Industry Act* (Energiewirtschaftsgesetz) and extensive provisions on accelerating the construction of power lines in Germany. Nuclear energy plants will have gradually phased out their power generation operations by the end of the year 2022.

The decision to phase out nuclear power plants has entailed major changes in radioactive waste management – dismantling, packaging spent fuel in containers, and interim storage and final disposal.

For one thing, the amount of radioactive waste requiring final storage is now easier to calculate and to limit, in contrast with periods of indefinite operation. Limiting the operating lives of nuclear plants also shortens the period in which assets can be generated for the decreased amounts of high-level, intermediate-level and low-level waste.

Along with the phase-out, the rapidly expanding renewable energy market and continued integration into the European Single Market has changed market conditions for nuclear power plant operators. Not only have new market participants joined the competition for power generation – due to a surplus and, ultimately, to price erosion in the international fuel markets, stock market prices for power have dropped dramatically. This has affected nuclear power plant operators in particular, because of their large share in conventional power generation.

1.1 Task of the Commission

In light of this, the Federal Government decided to appoint a commission named the Commission to Review the Financing for the Phase-out of Nuclear Energy (*Kommission zur Überprüfung der Finanzierung des Kernenergieausstiegs*, or KFK, hereinafter: the "Commission"). The resolution of October 14, 2015 states:

> *"The Commission is requested by the Federal Government to assess how to set up financing for decommissioning and dismantling of nuclear power plants and nuclear waste disposal in such a way that the companies responsible will be financially capable of meeting their obligations arising from nuclear energy operations on a long-term basis."*
>
> *"It is the declared aim of the Federal Government to provide the technical and financial framework required now and in the long term to en-*

sure the safe phase-out of operations at nuclear power plants, their decommissioning and dismantling and the temporary and final disposal of radioactive waste. In doing so, the Federal government operates on the principle that the costs are to be borne by the entity that incurred them."[1]

1.2 Costs and Provisions

The costs of disposal at 2014 prices[2] are estimated to be €**47.5 billion**[3]. Not included in this estimate are additional costs for complete dismantling in the amount of **€400 million** and **€900 million** for disposal of non-spent nuclear fuel.[4]

Under current laws the responsibility for providing funding lies with the operators[5]. Operators have created provisions for the costs as calculated at the time they fall due. These provisions amounted to **€38.3 billion** in 2014[6]. This includes costs for

a. decommissioning and dismantling nuclear power plants

b. packaging[7] radioactive fuel elements and radioactive waste from reprocessing (hereinafter: fuel reprocessing plant waste, or FRP waste),

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1 http://www.bmwi.de/BMWi/Redaktion/PDF/E/einsetzung-einer-kommission-zur-ueberpruefung-der-finanzierung-des-kernenergieausstiegs,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf.

2 This report uses 2014 prices throughout, unless noted otherwise. These figures are based on audited statements of the operating companies, on which the audit firm *Warth & Klein Grant Thornton* AG based its Expert Opinion on the Valuation of Provisions for Nuclear Energy of October 9, 2015, prepared for the Federal Ministry for Economic Affairs and Energy (hereinafter quoted as *Warth&Klein*). We based our report on these figures because they in turn are based on a cost estimate applied uniformly to all operators. However, **if funds are transferred**, the costs will be calculated at **current prices at the time of the transfer**. This should be taken into account when evaluating these figures.

3 *Warth&Klein, p. 8.*

4 *Warth&Klein, p. 9.* This would put the **total cost at €48.8 billion** at 2014 prices. If costs are transferred or provisions are created in the future, these amounts must also be taken into consideration.

5 In this report, the term "Operators" describes companies operating nuclear power plants in Germany. These include operating companies that are consolidated in the corporations *E.ON SE, RWE AG, EnBW Energie Baden-Württemberg AG*, *Vattenfall GmbH* and *Stadtwerke München GmbH (SWM, Munich public utility).*

6 Warth&Klein, p. 5.

7 The phrase "packaging radioactive fuel elements and radioactive waste from reprocessing (FRP waste)" refers in the following to loading transport containers and storage containers. Packaging of other radioactive waste (LAW and MAW) and operating waste (LAW and MAW) is re-

as well as packaging other radioactive waste (LAW and MAW and operating waste), containers required for intermediate and final disposal, transport and return transport of radioactive waste from reprocessing;

c. interim storage of radioactive waste;

d. final storage of radioactive waste (LAW and MAW) with negligible heat generation in the Konrad repository[8];

e. final disposal of radioactive fuel elements and high-level waste (highly-radioactive heat-generating waste: HAW) in a HAW final repository, including expenses for researching and selecting possible HAW final repositories.

Provisions are created for liabilities that cannot be accurately estimated or anticipated. The public and the government are responsible for providing funding for nuclear waste disposal. In this manner, Operators assure the government, the public and taxpayers that they are capable of disposing of the radioactive waste resulting from commercial use of nuclear power in a safe manner and without danger to humans or the environment. Provisions are recorded as debt under liabilities on the Operators' balance sheets.

1.3 Shared Responsibility and Separate Obligations of the Operators and the Government

The decision to enter the nuclear energy era was made mutually by government and industry after intense consultation. The commitment to **shared political responsibility** for nuclear energy was evidenced by a massive governmental effort in the area of research and development. However, this joint responsibility was also based on a clear **allocation** of the resultant **operational and legal obligations**. The prospect of generating profits by operating nuclear installations was counterbalanced by the Operators' duty to bear the cost of nuclear waste management.

Nuclear power plant Operators are obligated to safely recycle or properly remove any radioactive residues as well as any radioactive facility components that have been removed or dismantled as radioactive waste in the context of immediate final disposal (Sec. 9a (1) sent. 1 of the Atomic Energy Act).

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ferred to in the following as conditioning and loading into the container that has been properly packed for the final repository.

8 Additional waste includes radioactive fuel elements and radioactive waste from reprocessing.

The government is responsible for creating and operating final repositories, due to the particular hazard posed by radioactive fuel elements, FRP waste and other radioactive waste, and because of the long time periods required for such storage (Sec. 9a (3) sent. 1 of the Atomic Energy Act). It should be pointed out that the government is only responsible for actions to fulfil its obligations under these provisions, whereas the responsibility for funding these efforts is borne pro rata by the parties responsible for the radioactive waste (Secs. 21a and 21b of the Atomic Energy Act, Sec. 21 of the Repository Site Selection Act (Stand AG)). The government's responsibility (with regard to performance) for creating a final repository for high-level radioactive wastes in particular comprises the search for a site and selection of a final repository under the Repository Site Selection Act. Above and beyond that, the government's responsibility (with regard to performance) also includes creation, safe operation and closure of the final repository.

On the other hand, decommissioning and dismantling the nuclear power plants is the sole responsibility of the Operators. In addition, Operators are obligated to deliver the prepared radioactive waste to final repositories operated by the government (Sec. 9a (1b), (1c) and (2a) of the Atomic Energy Act). This means that, in addition to decommissioning and the actual dismantling of the plants, Operators must safeguard radioactive waste in interim storage until they can deposit it in final repositories, condition the waste in accordance with the conditions for accepting waste at the respective final repository, provide the proper containers, and finally transport the waste to the government-run storage sites. The radioactive fuel elements and FRP waste must be stored by the Operators until they deposit it to a final repository, and if necessary, be conditioned and packaged in compliance with the requirements for storage.

In other words, the government's responsibility for performance begins – after searching for, selecting and creating the final storage site – at the 'gates' of the repository.

The polluter-pays principle anchored in German law requires the government to secure funding for nuclear waste management. It is in the state's interest to ensure the long-term financial solvency of Operators and to indefinitely safeguard the funds set aside for this task against insufficient liquidity.

1.4 Economic Situation of Operators

A necessary condition for applying the polluter-pays principle as outlined in the foregoing is that the creditor or its legal successor exists and is solvent when the liabilities come due. A market economy does not usually allow for government guarantees for the solvency of private companies. However, the polluter-pays principle can only be applied if the Operators are financially capable of meeting their obligations arising from nuclear energy operations.

Operators differ widely, regarding both legal structure and ownership structure. They span from strictly state-owned entities to mixed public-private ownership, with widely-held companies owned by institutional investors at the other end of the spectrum.

Not just publicly listed companies, rather all Operators have been negatively affected by changes in the energy market, which have put them in a more precarious situation than before the energy transition. At that time, they dominated the power generation market.

Debts and reduced market shares caused rating agencies to lower Operators' ratings. This in turn made debt financing more expensive and, correspondingly, access to capital required for investments.

Uncertainty regarding prospective long-term financial obligations in connection with radioactive waste disposal has further restricted access to capital markets.

This is exacerbated by the negative impact of the prolonged low-interest-rate phase on all long-term provisions made by these companies. Almost all operators have had to increase their provisions – for example, for pensions.

While the Commission was preparing its report, some Operators mentioned that they would pay only a very small dividend or none at all to shareholders in 2016, due to their financial situation. In previous years some companies had distributed billions in dividends, despite losses.

1.5 Employment Situation

Approximately 210,000 employees currently work for Operators' companies. The difficult economic situation at these companies has already led to the loss of many jobs. It is not unlikely that there will be more lay-offs. In order to implement a smooth phase-out of nuclear power, the viability of companies and jobs are of utmost importance.

Decommissioning, dismantling and disposal of nuclear waste from the nuclear power plants must be carried out properly and according to the highest safety standards. A sufficient number of well-trained technical staff is indispensable during the entire withdrawal process. The affected employees must be given legal certainty and employment standards must be upheld.

- In light of this, the Commission has recommended a binding agreement to provide security to affected employees when implementing the consensus on nuclear waste disposal reached between the Federal Government and the operating companies. The following key points must be agreed:

- Monitoring the process of transforming nuclear energy companies from operating entities to dismantling companies by existing union and employee representative bodies;

- Securing jobs and employees' professional future by assigning tasks to employees within the companies during decommissioning, final operations and dismantling the nuclear power plants as well as during operation of the interim storage sites[9];

- Maintaining qualification levels by filling staff vacancies without delay (demographic considerations) and concluding new employment contracts with appropriate terms in the context of collective bargaining rules (collective bargaining agreements and works agreements);

- Job offers and protection of vested rights for employees in case of institutional changes and changes in ownership;

- Guarantee that employees will be transferred and collective bargaining agreements will be honored in case of transfer of business pursuant to Sec. 613a (1) of the German Civil Code (or material or financial compensation for employees).

1.6 Risks to the Government and to the Public

The possibility of Operator insolvency is less of a risk to the government or the public than is commonly thought. The possibility of these companies – previously called "utilities" – going bankrupt was inconceivable for a long time. Today, this is a possibility, yet not the most likely risk to covering the costs of disposal of radioactive waste.

Some Operators, for example, attempted to reduce their liability for disposal of nuclear waste by reorganizing their companies. For this reason, at the same time it set up the Commission on October 14, 2015, the Federal Cabinet drafted the *Act on Extended Liability for Costs of Dismantling and Disposing of Nuclear Energy Plant Waste*[10]. This draft is currently being deliberated in the German Bundestag.

On top of this, the continual outflow of dividends may increase concerns that there is an insufficient financial base for fulfilling obligations to dispose of nuclear waste.

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9 At the same time, this does not exclude specialized companies from being commissioned with individual tasks during dismantling.

10 Deutscher Bundestag Drucksache 18/6615.

For this reason, a different, more reliable source of funding is required to ensure that Operators have sufficient funds for disposing of radioactive waste.

1.7 Risk Mitigation

Improving the security of funding is necessary regardless of such developments.

The expert opinion prepared by *Warth&Klein* – also referred to as the *Stress Test* – assesses the market value of Operator net worth at **€83 billion**. The market value of the Operators' equity capital comes to **€44.5 billion** after deducting provisions for nuclear energy.

> *"Even net assets valued at market prices are sufficient for covering liabilities related to nuclear energy waste disposal..."*[11]

However, this would only cover provisions for the present. In the long period spanning dismantling, packaging[12], intermediate and final disposal, it is ultimately irrelevant whether assets will cover provisions,

> *"...rather whether future net income will cover future costs of disposal."*[13]

Even though the experts expressed that they expected this would be the case, nevertheless

> *"...it cannot be deduced from this that funding for future costs of disposal is secure.*
>
> *Projections on both net income and on costs of disposal are subject to a substantial degree of uncertainty."*[14]

The realization that

> *"...there is a 50% probability that projected costs of disposal and also net income are too low, but by the same token, there is a 50% probability that projections are too high."*[15]

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11 *Warth&Klein*, p. 17.

12 The term packing is defined in footnote 7.

13 *Warth&Klein*, p. 18.

14 *Warth&Klein*, p. 19.

15 ibid.

proves how difficult it is to make projections in this situation. It is important to address the risks that result from this uncertainty.

The measures we are recommending aim to reduce funding risks as much as possible.

However, reducing them as much as possible does not mean that we can avoid all risks. Here, the issue is risk mitigation. It is not possible to completely avoid risk.

This is due in part to the large time frame in which these funds must be secured. According to plans of the Federal Government,

- the Konrad repository for low-level waste and intermediate-level waste is slated to go into operation in 2022;
- a final repository for high-level waste will be determined by 2031, and;
- this final repository should go into operation around the year 2050.[16]

Even if several Commission members perceive these plans to be optimistic, they are generously long. When making the move to nuclear energy for peaceful uses, all those involved assumed that final repositories would be ready at a much earlier point in time. Government plans were made accordingly.

Earlier attempts to secure funding for nuclear waste management independently of the companies was rejected for many years by the Operators themselves. This was the case regarding suggestions for a public fund and for an association to be established by the Operators.

1.8 Conclusions: Task and Motivation

Without a better foundation for financing nuclear waste management, a situation could arise in which the public would have to bear a larger share of the cost of operating nuclear power plants, even though the Operators earned billions over the decades with these plants, especially in periods of high energy prices. Electricity customers have already paid for disposal once, with their energy bills.

It is immaterial whether default on final storage would be the financial responsibility of the Federal Government, or default in dismantling a plant would pose a burden on the Laender, who would have to provide substitute

16 Refer to the *Programme for the responsible and safe management of spent fuel and radioactive waste (National Programme)*, http://www.bmub.bund.de/fileadmin/Daten_BMU/Download_PDF/Nukleare_Sicherheit/nationales_entsorgungsprogramm_aug_en_bf.pdf.

performance. It does not matter whether the latter would then be able to claim reimbursement. In any case, the taxpayer would pay.

It is our goal to reduce the risk to the taxpayer of any failure in performing these duties and to enforce the polluter-pays principle, so that the government and the Operators can fulfil their responsibilities regarding nuclear waste disposal.

2 Business as Usual – What Will Happen If Nothing Happens

Action must be taken in this matter. A *business as usual* scenario shows just how important it is to secure better financing. What would happen if nothing happens?

2.1 Worldwide trend: Climate Protection and Renewables

Regarding the question whether future income will cover future costs, it is important to look at the business environment. In which markets should and can Operators be successful in the future?

The 2015 Paris Climate Conference has provided a global framework. The signatories agreed to take extensive measures to keep global warming "*significantly under 2°*".

In the run-up to the conference in Paris, the European Union agreed on climate protection targets for 2030. By that year, greenhouse gas emissions should be lowered by 40%, the share of renewable energy sources in energy consumption should be increased to 27% and energy efficiency increased by at least 27%.[17]

The focus of the Operators' activity is however the Federal Republic of Germany. Greenhouse gases should be reduced in Germany by 40% by the year 2020, 55% by 2030, and 70% by 2040. By 2050 they should by reduced by 80% to 90% compared to 1990 levels.[18]

The energy transition and climate protection require massive decarbonisation of the energy industry and of electric power generation, in particular. In order to achieve this as well, the share of renewables in energy consumption should be significantly increased, from 18% in 2020 to 60% in 2050. To reach this target, electricity produced from renewable energy sources must be increased from currently around 32% to over 80% in 2050.[19]

The furious growth in renewable energy sources in Germany has been a steep learning curve and has led to massive cost cutting. The costs of producing one kilowatt hour of photovoltaic energy has dropped by 75% in the last decade[20],

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17 Climate Protection in Figures, http://www.bmub.bund.de/fileadmin/Daten_BMU/Pools/Broschueren/klimaschutz_in_zahlen_2014_broschuere_en_bf.pdf, S. 11. The target for energy efficiency in 2020 can be increased by around 30%.

18 Climate Protection in Figures, p. 14

19 ibid.

20 https://www.ise.fraunhofer.de/en/publications/veroeffentlichungen-pdf-dateien-en/studien-und-konzeptpapiere/recent-facts-about-photovoltaics-in-germany.pdf (p. 8).

and costs of onshore wind energy have gone down by 80% since the beginning of the millennium.

This development has transformed global markets. In 2014, more renewable energy capacity was installed than fossil energy capacity, a first.[21] And this trend has continued. Wind, sun and water are becoming more and more competitive. According to estimates, renewables should grow by 37% this year. [22]

2.2 Difficult Environment

The shift in the energy markets has forced Operators to rethink their business models – a realization that a number of Commission members feel has come very late and only after numerous detours.

All Operators are stepping up their investments in offshore wind farms. Networks, distribution and trade will play a bigger role for this type of energy than for conventional electric power generation.

Operators have had varying success in re-orienting their businesses, yet this shift in focus requires massive investment. The restructuring process is fraught with numerous risks.

These include liabilities that are hard to predict regarding amount and due date – which applies to both radioactive waste and pensions, especially due to their long-term nature. This problem is exacerbated by the risk to all long-term provisions caused by the current low-interest-rate policy.

Some Operators are also confronted with risks stemming a possible exit from brown coal. Brown coal contamination harbours additional risks that cannot be fully assessed.

For this reason, *Moody's* has placed Europe's ten largest energy suppliers on review for another downgrade – including several operators of German nuclear power plants.[23]

This would make access to financial markets more expensive and further complicate the restructuring required and desired by the companies to enable them focus more on renewables, energy trading and enhance infrastructure.

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21 http://www.bloomberg.com/news/articles/2015-04-14/fossil-fuels-just-lost-the-race-against-renewables.

22 http://www.bloomberg.com/news/articles/2014-04-08/renewable-energy-installations-to-rise-37-by-2015-bnef-says.

23 https://www.moodys.com/research/Moodys-takes-rating-actions-on-30-European-unregulated-utility-groups--PR_343836.

As a consequence, the crisis some Operators are going through would deepen and increase the risk of loss of funding for nuclear waste disposal.

2.3 Conclusions

Doing nothing is not in the interest of the public, nor of the Operators. Action must be taken.

- Financing for radioactive waste disposal must be made more secure than it is now.
- In the long term it will be necessary to separate the means of financing radioactive waste disposal from the economic fate of the Operators.

Practically no one denies the need for action.

Both camps – long-term opponents of nuclear energy and formerly vehement proponents of extending plants' operating lives – are urging that financing be changed, and have presented their concerns to the Commission. Otherwise, taxpayers may ultimately end up paying the price for nuclear waste management – and at the same time, some Operators may be unable to survive due to uncertainty regarding these costs, among other things.

3 Two Models: Release from Liability or Extended Liability

The recommendations on improving financing and uncoupling financing from the Operators can be divided into two models. In a nutshell, the two options are a *foundation* or a *fund*.

Differentiating between foundations and funds is misleading – these options do not very much regarding legal form or sponsor, but are discernible regarding assets to be contributed. Whereas a fund involves only cash assets, a foundation may also include shares in the Operators. The major difference, however, lies in the approach to liability for existing risks.

Accordingly, it would be more appropriate to call the options *release from liability* or *extended liability*.

3.1 Transferring Risk to a Private Foundation

The model that the Operators mutually suggested to the Commission was inspired by the RAG-Stiftung, a foundation created to cover inherited liabilities of unlimited duration resulting from coal mining.

In this scenario, the Operators would have transferred assets corresponding to their nuclear energy provisions – up to the end of the operating lives of the nuclear power plants in 2022 – to a foundation, which would then have had responsibility for dismantling, packaging as well as for intermediate and final disposal of radioactive waste. All phases of radioactive waste disposal would have then been concentrated in one entity.

This transfer of assets would have released the Operators from all financial risk involved in disposal of nuclear waste. Their liability would be completely waived. This would make it much easier to access financial markets due to a better rating. They correspondingly expected an improvement in share prices.

The foundation was to invest the contributed assets and try to increase this capital with suitable interest rates such that it would ultimately cover any necessary costs incurred. However, Operators would only be liable in the amount of contributed assets. Any risks not reflected in the provisions would, if realized, have to be shouldered by the public and the government – meaning taxpayers. In addition, any shortfall in the expected return on the foundation's investment would also be borne by the government and the public.

3.2 Release from Liability to the Detriment of the Public

The foundation model suggested to the Commission with its release from liability meets with the following objections from our side:

- Any interest-rate or cost risks would be borne in their entirety by the public and the government.

- A number of members of the Commission were against transferring the task of final storage – previously the responsibility of the government – to a private company. In view of the hazard posed by radioactive waste, they requested that this task be left in government hands, as a part of the government's official duty.

- Completely transferring assets in the amount of all provisions would put the companies at risk. Transferring company shares is therefore out of the question. It would result in nationalizing the Operators.

- In essence, 15 years' worth of payments into a foundation are missing, because, despite the nuclear energy phase-out, both the government and Operators have relied in recent years on the system of creating provisions.

For these reasons we cannot recommend a foundation with release from liability.

3.3 Contributing Provisions to a Public Fund

The idea of a public fund is based on the two Swiss nuclear waste management funds. This model would also require the companies to contribute assets to a fund in the entire amount of their nuclear energy provisions. Here, too, the fund must achieve a reasonable return on the investment to clear inflation and increases in nuclear waste management costs.

Initially, the fund would only be liable in the amount of contributed assets. If this is insufficient, however, the Operators would have extended liability and would be required to make additional payments.

Under this model funds for disposal of radioactive waste are deposited with the government. Here, too, dismantling and packaging as well as intermediate and final storage are carried out by one entity. Interest-rate and cost risk remain with the Operators, in line with the polluter-pays principle.

3.4 Excessive Burden on Operators without Benefits for the Public

The fund model with extended liability would lead to an excessive burden on the Operators, without benefiting the public – regardless of any statutory obligation to contribute provisions to the fund:

- Completely transferring assets in the amount of all provisions would put the companies at risk. Transferring company shares is therefore out of the question. It would result in nationalizing the Operators.

- In essence, 15 years' worth of payments into a fund are missing, because, despite the nuclear energy phase-out, both the government and Operators have relied in recent years on the system of creating provisions.

- Unlimited liability would not make it easier to access financial markets. The crisis faced by the companies would continue.
- Extended liability only works if the debtors continue to be accessible, even in the long term. Given the protracted difficult economic situation facing the Operators, liability based on the polluter-pays theory could run aground.

For these reasons we cannot recommend a fund with unlimited extended liability.

3.5 Conclusions

Neither complete release from liability nor unlimited extended liability is suitable for securing financing for disposal of radioactive waste. Neither strict privatization nor strict nationalization will work.

We suggest a different approach involving risk mitigation on a new financial footing.

- This will mean a new allocation of duties.
- In the future, financing will follow duties.
- The funds for long-term risks in particular will be transferred to the government, who will safeguard them.

The task of securing financing is not a financing obligation. The financing obligation will remain with the party causing the waste.

4 Risk Minimisation and Securing Financing

In the view of the Commission, from now on any entity with obligations in the nuclear waste disposal chain should also be required to ensure funding. This approach is appropriate in view of coordinating control, responsibility and liability.

If the parties creating nuclear waste are not responsible (from now on) for disposing of this waste, the funds necessary for such must be transferred to the government.

The transferred funds must completely cover the interest-rate and cost risks. Conversely, the Operators have pointed out that there are various deductions and possibilities for lowering costs that would arise from the government taking over these funds. The Operators ask that this be set off against their liability.

The funds not transferred and remaining with the companies that are used for fulfilling their own obligations must be sufficient for covering such costs. In the future they must be secured and accounted for more transparently and must be easier to verify.

Dismantling and packaging, as well as intermediate and final storage must be executed quickly and efficiently after operation has been terminated – in order to also reduce costs and, correspondingly, risks.

4.1 Amount of Risk

The expert opinion submitted by *Warth&Klein (Stress Test) lists total costs at 2014 prices of* ***€47.5 billion***[24].

This includes:

a. **€19.7 billion** for decommissioning and dismantling nuclear power plants;

b. **€9.9 billion** for packaging radioactive fuel elements and radioactive waste from reprocessing (FRP waste), as well as packaging other radioactive waste (LAW and MAW and operating waste), containers required for intermediate and final disposal, transport and return transport of radioactive waste from reprocessing;

24 *Warth&Klein*, p. 8.

c. **€5.8 billion** for interim storage of radioactive fuel elements, FRP waste and other radioactive waste (including operating waste);

d. **€12.1 billion** for final storage of radioactive waste (LAW and MAW) with minimal heat generation in the Konrad mine and for

e. final storage of radioactive fuel elements and FRP waste (HAW) in a HAW final repository, including expenses for researching and selecting possible HAW final repositories.[25]

Not included in this cost estimate are projected additional costs of any necessary complete dismantling of the facilities in the amount of **€400 million**, as well as up to **€900 million** for disposal of non-radioactive fuel elements.[26]

Accordingly, the total cost at 2014 prices is **€48.8 billion**.

In the Commission's consultations with agencies, companies and non-governmental organizations, these cost estimates were assessed to be well-founded and in general realistic. Comparisons with cost estimates made in other countries[27] also demonstrate that they are plausible.

In light of this, the Commission has decided to base its work on the cost estimates made in the Stress Test.

4.2 Provisions for Risks?

The cost of disposing of nuclear waste should be secured with the provisions that have been created. Risk assessments, which are very long-term projections, are based on assumptions regarding inflation and possible escalation in the costs related to nuclear energy.

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25 ibid. The cost items for final storage of low-level, intermediate-level and high-level radioactive waste, already the obligation of the government, have been combined.

26 *Warth&Klein,* pp. 8 et seqq. This would put the **total cost at €48.8 billion** at 2014 prices. These additional costs were not taken into account in the other considerations. However, if costs are transferred or provisions are created in the future, these amounts must be taken into consideration.

27 France only recently, at the beginning of the year, raised its estimates for nuclear waste management costs by 50%: http://www.deutschlandfunk.de/frankreich-geplantes-atommuell-endlager-kaempft-mit.697.de.html?dram:article_id=344611. A report from the European Commission on investments in nuclear energy indicates massive differences in Europe regarding estimates of costs that will be incurred. Whereas Germany projects dismantling costs of at least €1 billion per reactor, the Czech Republic puts this number at only €0.3 billion. Refer to *Commission Staff Working Document Accompanying the document Communication from the Commission Nuclear Illustrative Programme (PINC)* of April 4, 2016, p. 34. Also refer to *Warth&Klein*, p. 52 for international cost estimates (however with the exception of the Czech Republic).

The Operators base their calculations on an average annual inflation rate of **1.6%**. Nuclear energy cost increases are estimated by operators to account for an additional **1.97%** annually.[28] Based on these assumptions, costs to be borne by Operators are estimated to amount to **€169.8 billion at the respective prices** up to the year 2099.[29]

If this figure is discounted at **4.58%** per year, the amount to be set aside in provisions is **€38.3 billion**.[30]

Existing provisions already cover well over 80% of the cost in today's prices. By international standards, the Commission perceives these provisions to be adequate. They exceed those of the UK, are well above those of France, and are slightly below those of Switzerland and Sweden. However, at this point it must be pointed out that all other countries used a higher real interest rate for calculating their provisions, sometimes twice that used by Germany.[31]

In comparison with past economic parameters, the Commission perceives the assumptions on interest rates and cost increases to be reasonable.

At the same token, the *Stress Test* points out that the current low-interest-rate phase bears risks for provisions. Low interest rates could make it necessary to increase provisions. Some Operators have already undertaken such increases in their nuclear provisions.

The *Stress Test* applies various interest rates and inflationary expectations. It makes the following observation, independently of the accounting method:

> *"The result of this alternative computation is a valuation range of between approximately €32.4 billion and approximately €68.9 billion."*[32]

A fluctuation margin of well over 100% compared with the lowest value is substantial. Provisions currently set aside in the amount of €38.3 billion are in the lower third of this range.

In consultations held by the Commission, representatives of the Operators indicated that using a real interest rate specific to nuclear energy of 1% for calculating provisions was a very conservative approach. An additional objection to the calculations was that periods with low interest rates are usually

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28 *Warth&Klein, p. 9.*

29 Ibid., p. 56.

30 Ibid., p. 5.

31 Ibid., p. 15.

32 Ibid., p. 14.

accompanied by low inflation, which makes sense. However, even if rate cuts do not result in commensurate increases in provisions, they will still have an effect on provisions, as shown by the premiums for inflation-protected securities. Amounts set aside for provisions will have to increase. This is also indicated by the fact that some Operators have increased provisions for pensions and for nuclear waste disposal. The same applies to the capital in a fund.

In the opinion of the Commission, this is a risk that needs to be taken in consideration, not only when companies set aside provisions, but also when funds are transferred.

According to the Commission, it is also risky to assume that nuclear-related costs will rise by 1.97%. The long time frame spanning until 2050 makes this assumption uncertain, a risk that must also be taken into account.

4.3 Reducing Risks with a New Financing Model

For the future, the Commission advocates the following:

- the task of dismantling should be left to the Operators, but provisions should be more transparent and thereby easier to ensure;
- Operators should still be responsible for packaging radioactive fuel elements and radioactive waste from reprocessing (FRP waste), as well as packaging other radioactive waste (LAW and MAW and operating waste), providing containers required for intermediate and final disposal, and arranging transport and return transport of radioactive waste from reprocessing, but creation of provisions for such tasks should be more transparent;
- Operators should transfer the task of interim storage to the government, along with the requisite funds as required to cover any risk; and
- the Government should remain responsible for final storage, but should receive requisite funds as required to cover any risk.

The obligation to secure financing is the result of the new assignment of tasks.[33]

4.4 Decommissioning and Dismantling

- The Commission suggests that the Operators should still remain responsible in the future for decommissioning and dismantling.

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33 This new assignment does not correspond to the allocation of costs a-e in this report.

The Commission perceives this solution to be the most advantageous. These companies are familiar with the facilities and, in particular, have their own qualified personnel that are capable of managing the process of dismantling. The employees would have the perspective of retaining their jobs, and remaining in the area and in their current companies, over a period of many years.

The advantages of know-how and job security would be lost if the companies opted for safe enclosure of the facilities for years on end. This might save money in the short term, but ultimately, it would not be cheaper.

- The Commission suggests amending the Atomic Energy Act[34] to legally anchor the obligation of the Operators to dismantle their nuclear power plants without delay and in compliance with radiation protection requirements.

- The Commission recommends that the Operators sign an agreement with the Federal Government obligating them to execute dismantling themselves, with their own staff and also commit to continue to comply with collective bargaining and works agreements.

- The Commission recommends amending and passing the Act on Extended Liability for Dismantling and Disposing of Nuclear Waste, in order to create clear provisions regarding liability.

The cost risk for decommissioning and dismantling was estimated at €19.7 billion in 2014. This risk will remain with the companies. Liability will be extended for an indefinite period.

- The Commission recommends leaving current provisions amounting to **€17.8 billion**[35] with the Operators.

- Operators must also create additional provisions for projected obligations in the amount of around €400 million if they are obligated to immediate dismantling down to the 'green field'.[36]

Current accounting standards require the Operators to create sufficient provisions for decommissioning and dismantling nuclear power plants, as well as for disposal of nuclear waste. These provisions are covered with assets in various stages of liquidity.

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34 Amendment to Sec. 7 (3) of the Atomic Energy Act: To retain compliance with radiation protection, exemptions are only allowed with prior approval of the atomic energy authorities.

35 *Warth&Klein, p. 14.* This is the status as of 12/31/2014, and may have changed since then.

36 Ibid., p. 34.

- In addition to information provided by Operators' current audited annual financial statements and annual reports, the Commission recommends requiring the Operators to provide more transparency not only regarding how well the future payments for dismantling and decommissioning are covered, but also if there are sufficiently liquid funds at the time they are due and, if timing issues emerge, how they could be successfully dealt with. The itemization of provisions in the balance sheet should also provide information indicating the various areas of nuclear energy obligations (decommissioning, dismantling, packaging, containers and intermediate and final storage). Furthermore, government agencies should be granted authority to request information regarding estimates used in creating these provisions.

This recommendation is modeled on how some Operators are already handling this issue and was demonstrated for the first time in the Stress Test. At the same time, this system avoids the disadvantages of an internal fund – also recommended to the Commission – which would lead to much higher provisions due to investment limitations.[37]

Allowing officials access to information heightens transparency, without endangering the process of supervision by auditors. At the same time, this also makes it possible to take political action if developments go in the wrong direction, and to indirectly point out possible irregularities to the auditors.

- The Commission recommends expediting and standardizing the approval process.

4.5 Packaging, Required Containers, Transport

- The Commission recommends that Operators should also be responsible in the future for packaging radioactive fuel elements and radioactive waste from reprocessing (FRP waste) as well as packaging other radioactive waste (LAW/MAW, including operating waste).

This recommendation is based on the foregoing discussion. There is a close connection between decommissioning and loading radioactive fuel elements into transport and storage containers on the one hand and dismantling and packaging other radioactive waste (LAW/MAW, including operating waste) on the other. Here, too, efficiency and retaining know-how are deciding factors.

The radioactive fuel elements and radioactive waste from reprocessing (FRP waste) packaged in transport and storage containers, as well as the packaged and monitored other radioactive waste (LAW/MAW, including operating

[37] *BBH*, p. 90.

waste) must then be transported to the interim storage sites – where necessary, to be set up by the Operators – and later to the final repository.

- The Commission recommends that in the future the government should be responsible for transport from interim storage to the final repository, and if radioactive fuel elements and FRP waste are involved, for producing packages suitable for HAW-final repositories.

A total cost of **€9.9 billion** at 2014 prices was estimated for packaging radioactive fuel elements and radioactive waste from reprocessing (FRP waste), as well as packaging other radioactive waste (LAW and MAW and operating waste), containers required for intermediate and final disposal, transport and return transport of radioactive waste from reprocessing. Costs for producing any necessary packages suitable for HAW-final repositories and for transport to the final repository should be deducted from the above amount.

- The Commission recommends leaving current provisions amounting to **€3.5 billion**[38] with the Operators.

- The Operators must also create additional provisions for estimated obligations in the amount of around **€900 million** for non-radioactive fuel elements if they are utilized and spent.[39]

Operators must be required to be prepared for the consequences of a continued low-interest-rate phase, which could result in increases in their provisions for packaging radioactive fuel elements and radioactive waste from reprocessing (FRP waste), as well as for packaging other radioactive waste (LAW and MAW and operating waste).[40]

- The Commission recommends amending and passing the Act on Extended Liability for Dismantling and Disposing of Nuclear Waste, in order to create clear provisions regarding liability during the packaging of radioactive fuel elements, reprocessing waste (FRP waste) and other radioactive waste.

The same new transparency rules and rights of access to information should apply to the remaining funds, just as for provisions for dismantling.

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38 This is the status as of 12/31/2014, and may have changed since then.

39 Ibid., p. 36.

40 *Warth&Klein*, p. 13. The experts estimate that this valuation could range between €5.0 billion and €18.2 billion.

4.6 Interim Storage

- The Commission recommends that the government assume the responsibility for interim storage and for securing financing for this storage upon delivery of properly conditioned fuel elements[41] to the interim storage site and upon delivery of properly packed containers[42] of low-level and intermediate-level waste to the provisional storage site.

- The Commission recommends that the Operators be required by law to construct interim storage on their sites for high-level waste and provisional storage sites for low-level and intermediate-level waste. The government will assume operation of these storage sites.

Operators are currently obligated to safekeeping of radioactive fuel elements, reprocessing waste (FRP waste) and other radioactive waste in interim storage until it is delivered to government repositories, for conditioning and finally for transport of the waste to government final repositories.

Interim storage already takes place during operation. When dismantling is completed, the duration of storage depends on availability of repository sites for low-level and intermediate-level waste, as well as for high-level wastes. Both repositories will be planned, and the sites determined, constructed and operated by the government.

In the opinion of the Commission, it makes sense to turn over responsibility for the interim storage sites to the government. In doing so, a clear allocation of responsibility is of utmost importance.[43] This recommendation takes this aspect into account.

From now on, the requirements for storing waste in the Konrad repository as adopted in the planning approval must be complied with when creating waste packaging for the repository. When properly packaged, these packages could be stored in a provisional storage site operated by the Federal Government or by a Federal contractor. The Commission expects that all parties involved will

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41 Conditioning takes place in *CASTOR* containers.

42 Proper packing means that the waste must comply with the provisions of Sec. 74 of the Radiation Protection Ordinance and the *Requirements for radioactive waste to be stored in final repositories* of December 2014 (http://www.endlager-konrad.de/SharedDocs/Downloads/Konrad/DE/fachunterlagen/endlagerungsbedingungen_konrad.pdf?__blob=publicationFile&v=7). The Operators are entitled to turn over containers packed in compliance with these provisions to the provisional storage sites, regardless of any subsequent changes in such provisions.

43 Up to now only one percent of low-level and intermediate-level waste has been properly packaged for future storage in the Konrad repository. This includes waste from Siemens.

soon resolve any issues regarding how to put this into practice. Responsibility for the waste is transferred to the Federal Government when it is accepted in the provisional storage site. The Federal Government is liable for any subsequent changes (except those that were evident or to be expected) in requirements for acceptance to the Konrad repository. Operators cannot reasonably be made responsible for subsequent changes to standards.

Any waste not yet located in government-operated interim and provisional storage sites would need to be treated by Operators in compliance with applicable requirements for acceptance to the repository. Responsibility for handling and financing of properly packaged waste will pass to the Federal Government upon delivery to the interim storage site or the provisional storage site.

- The Commission recommends transferring to the government the net present value of provisions for interim storage in the amount of **€4.7 billion**[44] plus the risk surcharge[45]. When the funds have been completely transferred and the risk surcharge paid, the Operators' liability for interim storage will end. Until complete payment of the risk surcharge, Operators will be liable for any cost exceeding the funds transferred.[46]

- The Commission recommends that the Atomic Energy Act stipulate which entity of the Federal Government is responsible for operating the interim storage sites.[47]

4.7 Final Storage

- The Commission recommends transferring the task of securing funding for selection, construction, operation and decommissioning of nuclear repositories to the government.

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44 The net present value is calculated based on costs and a defined real interest rate specific to nuclear energy (= discounting - (inflation + cost increase specific to nuclear energy)). This nuclear-related real interest rate must be standardized, because the Operators use various accounting methods. The rate used in these calculations was 1%, the same rate as for the uniform calculation of provisions. The net present value of interim storage costs was accordingly €4.7 billion as of 12/31/2014. The net present value must be recalculated and adjusted at the time the funds are transferred, using this method.

45 Regarding the amount of terms of payment of the risk surcharge refer to Chapter *4.8 Risk Surcharge and Release From Liability*.

46 Ibid.

47 Pursuant to Sec. 3 of the Repository Site Selection Act (StandAG), the task of organising final storage and determining standards for the search for a repository for high-level waste is the responsibility of the *Commission on Storage of High-level Waste* (Kommission Lagerung hoch radioaktiver Abfallstoffe). This commission will submit its report in mid-2016.

The government is responsible for creating and operating final repositories, due to the particular hazard posed by radioactive waste, and because of the long time periods required for such storage (Sec. 9a (3) sent. 1 of the Atomic Energy Act). The government has up until now only been responsible for carrying out these tasks. Financing has been the shared responsibility of the creators of radioactive waste (Secs. 21a and 21b of the Atomic Energy Act, and Sec. 21 of the Repository Site Selection Act). The government's responsibility (with regard to performance), especially for creating a final repository for high-level radioactive wastes, comprises the search for a site and selection of a final repository pursuant to the Repository Site Selection Act. Above and beyond that, the government's responsibility (with regard to performance) also includes creation, operation and safe closure of the final disposal site.

Due to the long periods of time involved, this performance responsibility is threatening to result in financing also becoming the responsibility of the government. For this reason it is necessary that the government assume responsibility for securing the funds to be provided by the entities causing the pollution, for carrying out the tasks of the final repositories.

The Commission has followed with particular interest similar models in Sweden and Switzerland. The latter has a special nuclear waste disposal fund.

- The Commission recommends transferring to the government the net present value of provisions in the amount of **€12.5 billion**[48] plus the risk surcharge[49]. When the funds have been completely transferred and the risk surcharge paid, the Operators' liability for interim storage will end. Until complete payment of the risk surcharge, Operators will be liable for any cost exceeding the funds transferred.[50]

4.8 Risk Surcharge and Release From Liability

Even though it has based its calculations on a projected rise in nuclear energy costs of nearly 2%, the government is still facing significant risks in assuming the task of securing financing for interim and final storage of nuclear waste.

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48 The net present value is calculated based on costs and a defined real interest rate specific to nuclear energy (= discounting - (inflation + cost increase specific to nuclear energy)). This nuclear-related real interest rate must be standardized, because the Operators use various accounting methods. The rate used in these calculations was 1%, the same rate as for the uniform calculation of provisions. The net present value of interim storage costs was accordingly €12.5 billion as of 12/31/2014. The net present value must be recalculated and adjusted at the time the funds are transferred, using this method.

49 Regarding the amount of terms of payment of the risk surcharge refer to Chapter *4.8 Risk Surcharge and Release From Liability*.

50 Ibid.

This applies not only to the return on transferred capital, but also to any costs exceeding projections.

Even in the present system involving provisions, the companies have been liable for cost increases due to continued improvements in science and technology – in the same manner that they benefited from any resulting cost savings. Uncertainty regarding these opportunities and risks alike will not change by transferring money to a fund.

Costs and interest rate risks are hard to assess in the area of final storage of nuclear waste due to the long periods of time involved. Returns on capital achieved in the past can no longer be counted on in a persistently long low-interest-rate phase.

If the government assumes such risks, they must be adequately covered. According to the Commission, an appropriate solution would include a risk surcharge on the net present value of current provisions that reflects both interest-rate risks and cost risks, as well as a subsequent release of Operators from liability. This arrangement would also prevent any issues arising from state aid.

- The Commission recommends immediate transfer of funds to a public fund for financing interim storage and selection, construction, operation and decommissioning nuclear repositories, in the amount of current provisions totalling **€17.2 billion**[51] and, at the latest by the end of operations in 2022, transferring to this fund a risk surcharge of **around 35%** of the net present value of transferred provisions. The surcharge will close any gap between provisions and actual costs. The payment would equal the final asset value – at the time of the payment – of the net present value of the provisions.

- The Commission recommends that Operators' liability for interim storage and final storage should end upon complete transfer of funds and payment of the total risk surcharge. Operators will be released individually from liability. Until complete payment of the risk surcharge, Operators will be liable for any costs exceeding the funds transferred.

This arrangement attempts to satisfy the interests both of the government and of the Operators.

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51 The net present value is calculated based on costs and a defined real interest rate specific to nuclear energy (= discount rate - (inflation rate + cost increase specific to nuclear energy)). Based on a nuclear-related real interest rate of 1%, the net present value of the transferred tasks was €17.2 billion as of 12/31/2014.

The economic advantage resulting from release from liability for final repositories is greater than from release from liability for interim storage, with respect to company valuations and the Operator's access to financial markets.

Payment of the risk surcharge will affect the companies' equity – yet on the other hand may lead to tax reductions for the companies.

Given the varying economic situations of the Operators, the Commission therefore offers them the opportunity to achieve release from liability step by step, in return for step-by-step payment of the risk surcharge.

- The Commission recommends allowing Operators to also gradually[52] release themselves from liability by rendering payments until the plants terminate operation.[53] The payment would equal the final asset value[54] – at the time of the payment – of the net present value of the transferred provisions.[55] Liability would apply to individual Operators.

- The Commission suggests that the Federal Government could sign an *earn-out* agreement with those Operators choosing the option of step-by-step release from liability, linking payment of the risk surcharge to profits – without the necessity of creating new provisions. If the risk surcharge has not been completely paid by 2022, the companies must create provisions to cover extended liability. In this case, parent companies are liable for their subsidiaries. Spin-offs are liable to their parent companies. This arrangement must be reflected in the Act on Extended Liability.

In return for complete payment of **€23.3 billion**[56], risks for interim and final storage would be transferred to the government, which would, in the future, secure these payments in a public fund. In return for complete payment, the Operators would be released from extended liability for interim and final storage. The Operators would still have extended liability for dismantling and for containers.

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52 If a company had only paid half of the risk surcharge by a certain year, it would have extended liability for 50% of the additional costs.

53 The decision between either release from liability or extended liability must have been made by the time operation has ceased.

54 The net present value is calculated based on costs and a defined real interest rate specific to nuclear energy (= discount rate - (inflation rate + cost increase specific to nuclear energy)).

55 Until now companies have used a discount rate based on a 3% real interest rate and an average inflation rate of 1.6%. For individual tranches this method would lead to correspondingly higher amounts at the time payments are due.

56 In net present values based on 2014. The payment would equal the final asset value – at the time of the payment – of the net present value of the provisions.

Securing funds for interim and final storage by means of a public fund uncouples this money from the long-term earning power of the Operators, thereby significantly reducing the risk of default compared with current method of funding with provisions.

4.9 Consensus on Nuclear Waste Disposal and the End of the Controversy On Phase-out

A new consensus on nuclear waste disposal could put a final end to the controversial debate on the use of nuclear power. A number of legal disputes between Operators and various government agencies are currently pending before administration and civil courts, the Federal Constitutional Court and an arbitration tribunal. In order to achieve a sustainable solution, it would be desirable to set aside these legal disputes.

- Under these circumstances, the Commission emphasizes that the provisions available – regardless of whether the corresponding assets remain in the companies or are transferred to the government – are earmarked in any event. They serve to secure funding for the costs of disposal of radioactive waste. They are not available for settling any other legal claims.

The proposed consensus on nuclear waste disposal will certainly provide a solution to a number of issues regarding financing and responsibility for nuclear waste disposal.

- The Commission calls upon Operators to drop their claims relating to this issue.

The reorganization of their companies that Operators strive for will more likely be hindered than fostered by prolonged legal disputes on atomic energy.

4.10 Conclusion: Responsibility, Safety and Certainty – A New Consensus on Nuclear Waste Disposal

Combining operational obligations with financial responsibility will form the basis for a new consensus on radioactive waste disposal that can also be designed to comply with European law.

This creates more certainty by limiting risks.

- Costs for dismantling, decommissioning and packaging as well as for return transport of radioactive waste from reprocessing (FRP waste) – which comprise around half of disposal costs – must be more reliably secured in the companies in the future. Reporting of such provisions will become more transparent, making the provisions easier to monitor.

- Companies will have unlimited extended liability for dismantling, decommissioning and packaging. Risks will be limited by limiting the term of liability to complete dismantling. This makes it easier for companies to calculate risks. It will be the companies' statutory duty to commence dismantling without delay.

- The costs for interim and final storage – the other half of costs of nuclear waste disposal – will be secured by the government in the future.

- For this purpose, Operators' funds will be transferred to the government. The risk to the government will be mitigated by a risk-appropriate surcharge to be paid by Operators. The release of Operators from extended liability can take place step by step by payment in installments of the risk surcharge.[57]

- This consensus will provide greater certainty, both for operators and for the public.

[57] Regarding the amount of terms of payment of the risk surcharge refer to Chapter *4.8 Risk Surcharge and Release From Liability*.

5 Fund for Nuclear Power Plant Waste Disposal

Transfer of funds to the government obligates the government to earmark these funds for safe disposal.

5.1 Transfer to the Government

The funds to be transferred must cover future costs for interim and final storage of nuclear waste.

- The Commission recommends legally[58] stipulating that the funds be transferred to the government in the form of money. The transfer must be calculated using the cost base of the year the money is transferred – that is to say – the funds must be calculated using the appropriate interest rate.[59]

Funds should be deposited in a public fund.

5.2 Fund or Special Trust

A public fund can take the legal form of a Federal Government trust. Examples of this type of trust are the Energy and Climate Fund, the "Statutory Long-term Care Insurance Fund" and the Restructuring Fund created for the banks with the Restructuring Fund Act.

A public fund can also take on the legal form of a public foundation. This possibility differs from a pure trust fund basically in that this fund would not be administered by any existing federal authority, rather by a public foundation that would be established for this purpose. The government creates public foundations by statute. Details are set out in articles of association.

- The Commission recommends passing a law[60] to set up a public fund.

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58 For example, an Act to Create a Public Foundation to Ensure the Financing of the Nuclear Power Phase-out.

59 The same calculation method used for creating provisions should be used in determining the net present value. A nuclear-specific real interest rate of 3% should also be used.

60 An Act to Create a Public Foundation to Ensure the Financing of the Nuclear Power Phase-out could include the following items:
- Creation of a public law foundation and creation of a public law fund for this public law foundation.
- The assets to be administered by the foundation (the public fund) should be separated as such from the assets of the foundation (used basically to pay administration costs).
- The dedication of foundation assets to the purpose of permanent safeguarding and administration of funds required for decommissioning and dismantling the nuclear power plants and for the proper removal of radioactive waste by means of direct deposit in repositories.

The fund could have a lean administration and should be able to pay for itself. In particular, the issue of disbursements from the fund – which would be dissolved in the end – could be arranged under one roof without the customary conflicts between various departmental areas of responsibility. Above all, this type of fund would be better protected than a trust against greed and interference from non-related sources.

- Specifying the entities responsible for contributing to the fund and stipulating corresponding statutory payment obligations (special levies) and standardising any obligation to make any additional contributions.
- Anchoring the possibility of successive payments; specifying the latest possible date on which the projected required total amount of funding must be contributed to the public fund.
- Setting up rules for the foundation regarding proper and sustainable fund administration. Management using target agreements on real interest rate goals and basic investment policies for the foundation.
- Setting up the statutory bodies of the foundation.

6 Notes

6.1 Resolution

Appointment of a

Commission to Review
the Financing for the Phase-out of Nuclear Energy ("Kommission zur Überprüfung der Finanzierung des Kernenergieausstiegs (KFK)")

1. Making the nuclear energy phase-out safe and secure

   The Federal Government and the German Bundestag have decided to properly phase out the use of nuclear energy in Germany. Nuclear energy plants will have gradually phased out their power generation operations by the end of the year 2022. Regarding radioactive waste disposal, the Repository Site Selection Act provides a legal framework for a scientifically-based, transparent procedure for selecting a site for final storage of highly radioactive waste in particular. The procedure for site selection is determined by the "Commission for Storage of Highly Radioactive Waste Materials", which prepares a corresponding report and recommendations pursuant to the Repository Site Selection Act.

   It is the declared aim of the Federal Government to provide the technical and financial framework required now and in the long term to ensure the safe phase-out of operations at nuclear power plants, their decommissioning and dismantling and the temporary and final disposal of radioactive waste. In doing so, the Federal Government operates on the principle that the costs are to be borne by the entity that caused them. At the same time, the Federal Government wishes to ensure that the companies responsible will be financially capable of meeting their obligations arising from nuclear energy operations on a long-term basis. For this purpose, the Federal Government will appoint a "Commission to Review the Financing for the Phase-out of Nuclear Energy (KFK)", which should prepare recommendations for action by the end of January 2016.

2. Commission to Review the Financing for the Phase-out of Nuclear Energy

   The Commission is requested by the Federal Government to assess how to set up financing for decommissioning and dismantling of nuclear power plants and nuclear waste disposal in such a way that the companies responsible will be financially capable of meeting their obligations arising from nuclear energy operations on a long-term basis. For this purpose, the Commission will compare and assess the various models currently being discussed with regard to future financing of decommissioning and dismantling of the nuclear power plants and of disposal of radioactive

waste, including interim and final storage. The Commission will also evaluate the results of the Stress Test commissioned by the Federal Ministry for Economic Affairs and Energy to review provisions created for nuclear energy. The Commission will submit a recommendation to the Federal Committee of State Secretaries for Nuclear Energy by the end of January 2016.

3. Members

The following individuals are appointed as members of the Commission:

- Ole von Beust (Co-chair)
- Michael Fuchs
- Hartmut Gaßner
- Monika Griefahn
- Ulrich Grillo
- Regine Günther
- Gerald Hennenhöfer
- Reiner Hoffmann
- Prof. Karin Holm-Müller
- Bischof Ralf Meister
- Prof. Dr. Georg Milbradt
- Dr. Georg Nüßlein
- Matthias Platzeck (Co-chair)
- Simone Probst
- Dr. Werner Schnappauf
- Jürgen Trittin (Co-chair)
- Ute Vogt
- Hedda von Wedel
- Dr. Ines Zenke

4. Support from the Federal Government

The Commission will receive technical and organizational assistance from an interministerial working team at the Federal Ministry for Economic Affairs and Energy, comprised of representatives from the Federal Ministry for Economic Affairs and Energy, the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, the Federal Ministry of Finance and the Federal Ministry of Transport and Digital Infrastructure. Representatives of the aforementioned ministries will take part in meetings held by the Commission. Representatives of the Federal Chancellery are welcome as guests.

5. Procedure

The Commission will submit its findings in the form of a written report to the Committee of State Secretaries for Nuclear Energy at the end of January 2016. The Federal Government will publish this report.

Prior to submitting its report, the Commission should allow the parties affected by this report the opportunity to express their opinion in the context of consultations.

Members of the Commission will be reimbursed for their expenses.

Apart from this, the Commission will take its own decisions on organizational issues.

6.2 Consultations with Operators, Experts and the Public

6.2.1 Operators

EnBW Energie Baden-Württemberg AG, represented by:

- Dr. Hans-Josef Zimmer (Spokesman), member of the executive board and Chief Technical Officer (CTO);
- Thomas Kusterer (Spokesman), member of the executive board and Chief Financial Officer (CFO);
- Dr. Guido Kraß, Leiter Recht Erzeugung (Head of Legal and Generation);
- Dr. Andreas Renner, Leiter Politik, Wirtschaft und Gesellschaft (Head of Policy, Economy and Society);
- Dirk Janz, Auditor at KPMG.

E.ON SE, represented by:

- Dr. Leonhard Birnbaum (Spokesman), member of the executive board and Chief Regions Officer;
- Michael Sen (Spokesman), member of the executive board and Chief Financial Officer;
- Dr. Guido Knott, Chairman of the Board of Management of E.ON Kernkraft GmbH;
- Dr. Mario Pohlmann, Head of Energy Law;
- Andreas Röper, Head of Accounting;
- Markus Dittmann, Auditor at PWC.

RWE AG, represented by:

- Dr. Rolf Martin Schmitz (Spokesman), deputy Chairman of the Executive Board and COO
- Dr. Bernhard Günther (Spokesman), CFO;
- Dr. Ulrich Rust, Head of Legal for RWE Generation;
- Dr. Thomas Beermann, Leiter Kernenergie- und Bergbaurückstellungen/Projekte (Head of Provisions for Nuclear Energy and Mining/Projects);
- Stephanie Schunck, Leiterin Kommunikation und Energiepolitik (Head of Communications and Energy Policy) RWE Generation;
- Michael Reuther, Auditor at PWC.

Vattenfall AB, represented by:

- Stefan Dohler (Spokesman), member of Executive Group Management, Senior Vice President Markets;
- Axel Pinkert (Spokesman), Member of the Management Board Vattenfall GmbH, Finances;
- Dr. Andreas Metzenthin, Head of Legal for Germany;
- Alexander Jung, Generalbevollmächtigter Berlin/ Head of Public Affairs and Media Relations Deutschland;
- Gunnar Glöckner, Auditor at Ernst & Young.

6.2.2 The Public, Experts

Individuals participating in consultations ***(in alphabetical order)***	**Organization**	**Date of consultation**
Prof. Dr. Hans-Wolfgang Arndt *Emeritus, Chair for public law and tax law until 2012*	University of Mannheim	5th meeting of 12/17/2015
Dr. Ralf Bartels *Abteilungsleiter Energiewende/Nachhaltigkeit (Head of Energy transition/Sustainability)*	Industriegewerkschaft Bergbau, Chemie, Energie (IG BCE: Mining, Chemical and Energy Industrial Union), Hannover	5th meeting of 12/17/2015
Thorben Becker *Leiter Atompolitik in der Bundesgeschäftsstelle des BUND (Head of Nuclear Energy Policy)*	Bund für Umwelt und Naturschutz Deutschland e.V. (BUND: Friends of the Earth, Germany)	5th meeting of 12/17/2015
Rudolf Böck *Auditor and tax adviser, Partner*	Becker Büttner Held, Munich	2nd meeting of 11/16/2015
Tobias Büchler *Chartered Financial Analyst (CFA), Associate, EMEA Corporate Ratings*	Standard & Poor's Credit Market Services Europe Ltd. (German office)	4th meeting of 12/1/2015

Individuals participating in consultations ***(in alphabetical order)***	**Organization**	**Date of consultation**
Dr. Alexander Budzinski *Manager*	Warth & Klein Grant Thornton AG Public Auditors, Düsseldorf	2nd meeting of 11/16/2015
Dr. Olaf Däuper *Attorney-at-law, Partner*	Becker Büttner Held, Berlin	2nd meeting of 11/16/2015
Dr. Alexander Dietzel *Attorney-at-law*	Becker Büttner Held, Berlin	2nd meeting of 11/16/2015
Prof. Dr. Dr. Udo Di Fabio *Professor für öffentliches Recht, Richter des Bundesverfassungsgerichts a.D. (Professor of public law, former judge at the Federal Constitutional Court)*	Rheinische Friedrich-Wilhelms-Universität Bonn	5th meeting of 12/17/2015
Mario Dürr *Mayor of the Municipality of Neckarwestheim, Chairman of ASKETA*	Arbeitsgemeinschaft der Standortgemeinden kerntechnischer Anlagen in Deutschland (ASKETA: Working group of municipalities with nuclear facilities in Germany)	5th meeting of 12/17/2015
Dr. Hermann Falk *Managing Director*	German Renewable Energy Federation (BEE), Berlin	5th meeting of 12/17/2015
Swantje Fiedler *stv. Geschäftsführerin, Leiterin Energiepolitik (Deputy Managing Director, Head of Energy Policy)*	Forum Ökologisch Soziale Marktwirtschaft (FÖS: Green Budget Germany), Berlin	4th meeting of 12/01/2015

Individuals participating in consultations ***(in alphabetical order)***	**Organization**	**Date of consultation**
Dr. Ulrich Grosch *Leiter der Abteilung Zahlungsbilanz, Wechselkurs und Kapitalmarktanalyse (Head of Balance of payments, Exchange rates and Capital market analysis)*	German Federal Bank, Frankfurt am Main	6th meeting of 1/12/2016
Prof. Dr. Georg Hermes *Professor für öffentliches Recht, Fachbereich Rechtswissenschaft (Professor for public law, Faculty of Law)*	Goethe University, Frankfurt am Main	5th meeting of 12/17/2015
Dr. Dieter Heuskel *Senior Partner und Managing Director*	The Boston Consulting Group (BCG), Düsseldorf	4th meeting of 12/01/2015
Prof. Dr. Wolfgang Irrek *Studiengangsleitung Wirtschaftsingenieurwesen-Energiesysteme (Head of the program for industrial engineering for energy systems)*	University Hochschule Ruhr-West (HRW), Mülheim an der Ruhr	4th meeting of 12/01/2015
Norbert Islinger *Betriebsrat des Kernkraftwerks Isar 2 (Works council member for the atomic energy plant Kernkraftwerk Isar 2)*	E.ON Kernkraft GmbH, Niederaichbach	5th meeting of 12/17/2015
Prof. Dr. Martin Jonas *Senior Partner*	Warth & Klein Grant Thornton AG Public auditors, Düsseldorf	2nd meeting of 11/16/2015
Wolfram König *President*	Federal Office for Radiation Protection (BfS), Salzgitter	4th meeting of 12/01/2015
Christopher Kuplent *Investment Analyst, European Energy, Global Equity Research*	Bank of America Merrill Lynch (BAML), London	4th meeting of 12/01/2015

Individuals participating in consultations ***(in alphabetical order)***	**Organization**	**Date of consultation**
Hildegard Müller *Vorsitzende Hauptgeschäftsführung und Mitglied des Präsidiums (Chair of the Board of directors and member of the presidium)*	German Association of Energy and Water Industries, Berlin	5th meeting of 12/17/2015
Tobias Münchmeyer *Spokesman*	Greenpeace e.V., Hamburg	5th meeting of 12/17/2015
Simon Christian Pfender *Manager*	Warth & Klein Grant Thornton AG Public auditors, Düsseldorf	2nd meeting of 11/16/2015
Prof. Dr. Dorothea Schäfer *Forschungsdirektorin Finanzmärkte, Abteilung Makroökonomie (Director of Research on Financial Markets, Macroeconomics Department)*	German Institute for Economic Research, Berlin	4th meeting of 12/01/2015
Dr. Michael Siemann *Head of the Division Radiological Protection and Radioactive Waste Management*	OECD, Nuclear Energy Agency (NEA), Paris	4th meeting of 12/01/2015
Heinz Smital *Spokesman*	Greenpeace e.V., Hamburg	5th meeting of 12/17/2015
Dr. Jelena Stapf *Diplom-Volkswirtin, Zahlungsbilanz-, Wechselkurs und Kapitalmarktanalyse (Head of Balance of payments, Exchange rate and Capital market analysis)*	German Federal Bank, Frankfurt am Main	6th meeting of 1/12/2016
Jochen Stay *Spokesman*	.ausgestrahlt e.V., Hamburg	5th meeting of 12/17/2015

Individuals participating in consultations ***(in alphabetical order)***	**Organization**	**Date of consultation**
Walter Steinmann *Director*	Swiss Federal Office of Energy, Bern	4th meeting of 12/01/2015
Prof. Dr. Joachim Wieland *Rektor, Lehrstuhl für öffentliches Recht, Finanz- und Steuerrecht (Provost, Chair for public law, finance and tax law)*	German University of Administrative Sciences Speyer	5th meeting of 12/17/2015
Dr. Benedikt Wolfers *Attorney-at-law and Partner*	Freshfields Bruckhaus Deringer, Berlin	5th meeting of 12/17/2015
Dr. Cornelia Ziehm *Attorney-at-law*		5th meeting of 12/17/2015

6.3 Expert Opinions and Responses

Prof. Dr. Hans-Wolfgang Arndt, Response to the Expert Opinion submitted by Becker Büttner Held, 3/14/2015

Prof. Dr. Hans-Wolfgang Arndt, Gesetzliche Entsorgungs- und Stilllegungspflichten der Kernkraftwerksbetreiber – Zur Zulässigkeit eines Systemwechsels von Rückstellungen zu anderen gesetzlichen Sicherungsalternativen (Statutory Obligations for Nuclear Plant Operators Regarding Disposal of Nuclear Waste and Decommissioning – On the Admissibility of Switching from a System Based on Provisions to Other Statutory Alternatives for Securing Financing), 5/26/2014

.ausgestrahlt e.V., Response to Consultation with the Atomic Finance Committee of the Federal Ministry for Economic Affairs and Energy, 12/17/2015

Becker Büttner Held, Rechtsanwälte Wirtschaftsprüfer Steuerberater (Attorneys-at-Law, public auditors and tax advisors, Partnership of Lawyers), Finanzielle Vorsorge im Kernenergiebereich – Etwaige Risiken des Status quo und mögliche Reformoptionen (Financial Preparedness in the Atomic Energy Sector – Possible Risks for the Status Quo and Possible Options for Reform), 12/10/2014

The Boston Consulting Group GmbH, Lösung der Nuklearproblematik in Deutschland (Solving the Nuclear Issue in Germany), October 2015

Bund für Umwelt und Naturschutz Deutschland e.V. (*Friends of the Earth Germany*), Stellungnahme des BUND in der Anhörung der KFK am 17.12.2015 – Verursacherprinzip darf nicht aufgeweicht werden (BUND's response to the consultation of 12/17/2015 – The Polluter-pays Principle May Not Be Weakened), 12/17/2015

Deutsche Bundesbank (*German Federal Bank)*, Schriftliche Stellungnahme der Deutschen Bundesbank vom 08.01.2016 anlässlich der Sitzung der Kommission zur Überprüfung der Finanzierung des Kernenergieausstiegs (KFK) am 12. Januar 2016 zur Frage der Höhe des Diskontierungssatzes (Written response of the German Federal Bank of 1/8/2016 to the Commission meeting on 1/12/2016 regarding the discount rate), 1/08/2016

Prof. Dr. Dr. Udo Di Fabio, Verfassungsrechtliche Grenzen für einen Systemwechsel im deutschen System der Kernenergierückstellungen (Constitutional Law Limitations on A Change in the German System for Provisions for Nuclear Energy), March 2015

Forum Ökologisch-Soziale Marktwirtschaft e.V. (Green Market Germany), Atomrückstellungen für Stilllegung, Rückbau und Entsorgung – Kostenrisiken und Reformvorschläge für eine verursachergerechte Finanzierung (Atomic Energy Provisions for Decommissioning, Dismantling and Dis-

posal – Cost Risks and Recommendations for a Polluter-Pays Financing System), 10/10/2014

Freshfields Bruckhaus Deringer LLP, Stilllegung und Entsorgung Kernenergie – Rechtsgutachten zur finanziellen Vorsorge für Stilllegung, Rückbau und Entsorgung in der Kernenergiewirtschaft (Nuclear Energy Decommissioning and Disposal – Legal Opinion on Financial Preparedness for Decommissioning, Dismantling and Disposal in the Area of Nuclear Power) , 11/11/2015

Gaßner, Groth, Siederer & Coll. Partnerschaft von Rechtsanwälten mit beschränkter Berufshaftung (Limited Liability Partnership of Lawyers), Sicherung der Atomrückstellungen durch Übertragung in einen öffentlich-rechtlichen Fonds (Securing Provisions for Atomic Energy by Transfer to a Public-Law Fund), 9/11/2015

Prof. Dr. Georg Hermes, Verfassungsfragen einer langfristigen und sicheren Finanzierung des Rückbaus und der Entsorgung von Kernkraftwerken – Kurzfassung der Stellungnahme im Rahmen der Sachverständigenanhörung der Kommission zur Überprüfung des Finanzierung des Kernenergieausstiegs am 17.12.2015 (Constitutional Issues Regarding Long-term and Secure Financing of the Dismantling and Disposal of Nuclear Power Plants – Short Version of a Response to the Consultation with the Commission on 12/17/2015), 12/17/2015

Initiative AtomErbe Obrigheim und AG AtomErbe Neckarwestheim mit Bund der Bürgerinitiativen Mittlerer Neckar, Aktionsbündnis Energiewende Heilbronn, BUND-Regionalverband Heilbronn-Franken und weitere (Public-interest groups), Was kostet das atomare Erbe, wer muss dafür zahlen? Warum sind echter Strahlenschutz und sofortiger Ausstieg unverzichtbar? (What will the atomic legacy cost, and who will have to pay for it? Why is effective radiation protection and an immediate phasing-out absolutely necessary?), 1/11/2016

Prof. Dr. Wolfgang Irrek, Thesenpapier – Sicherstellung der Finanzierung von Rückbau und langfristiger Sicherung des radioaktiven Materials anlässlich der öffentlichen Anhörung der Kommission zur Überprüfung der Finanzierung des Kernenergieausstiegs (KFK) am 01. Dezember 2015 in Berlin (Ensuring Financing for the Dismantling of Nuclear Power Plants and long-term Securing of Radioactive Material on the Occasion of the Public Hearing of the Commission to Review the Financing for the Phase-out of Nuclear Energy (KFK) on December 1st 2015 , 1/12/2015

Warth & Klein Grant Thornton AG Wirtschaftsprüfungsgesellschaft, Gutachtliche Stellungnahme zur Bewertung der Rückstellungen im Kernenergiebereich (Expert Opinion on the Valuation of Provisions for Nuclear Energy), 10/9/2015

Prof. Dr. Joachim Wieland, Finanzierungsvorsorge für den Rückbau von Kernkraftwerken (Financial Preparation for Dismantling Atomic Energy Plants), 12/17/2015

Dr. Cornelia Ziehm, Sicherstellung der Finanzierungsvorsorge für den Rückbau der Atomkraftwerke und die Entsorgung radioaktiver Abfälle (Ensuring Financing for the Dismantling of Nuclear Power Plants and Disposal of Radioactive Waste), July 2015 (updated October 2015)

6.4 Minutes of Commission Meetings

3rd public meeting on 11/25/15:

ttp://www.bmwi.de/BMWi/Redaktion/PDF/P-R/protokoll-3-kfk-sitzung,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf

4th public meeting on 12/1/2015:

http://www.bmwi.de/BMWi/Redaktion/PDF/P-R/protokoll-4-kfk-sitzung,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf

5th public meeting on 12/17/15:

http://www.bmwi.de/BMWi/Redaktion/PDF/P-R/protokoll-5-kfk-sitzung,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf

6.5 List of Abbreviations

Atomic Energy Act	Act on the Peaceful Utilization of Atomic Energy and on the Protection against Its Hazards (AtG: Gesetz über die friedliche Verwendung der Kernenergie und den Schutz gegen ihre Gefahren (Atomgesetz))
BBH	Becker Büttner Held Rechtsanwälte Wirtschaftsprüfer Steuerberater Partnergesellschaft (Attorneys-at-law, auditors and tax advisors)
Commission	Commission to Review the Financing for the Phase-out of Nuclear Energy presents recommendations to the Federal Government (KFK: Kommission zur Überprüfung der Finanzierung des Kernenergieausstiegs)
FRP	fuel reprocessing plant
GW	Gigawatt
HAW	High Active Waste – High-Level Waste (HLW)
ibid.	ibidem, in the same place
MAW	Medium Active Waste - Intermediate-Level Waste (ILW)
LAW	Low Active Waste - Low-Level Waste (LLW)
Renewable Energy Act	Act on the Priority of Renewable Energies (EEG: Gesetz für den Ausbau erneuerbarer Energien)
Repository Site Selection Act	Act on the Search for and Selection of a Site for final repository for heat-generating radioactive waste (StandAG: Gesetz zur Suche und Auswahl eines Standortes für ein Endlager für Wärme entwickelnde radioaktive Abfälle)
Warth & Klein	Warth & Klein Grant Thornton AG Wirtschaftsprüfungsgesellschaft (Auditors)

6.6 Work Schedule

Date	Event
11/05/2015	1st (inaugural) meeting of the Commission, Berlin Adoption of a resolution on organizational and procedural issues
11/16/2015	2nd meeting of the Commission, Berlin Consultation with experts for the Federal Government: -Becker, Büttner, Held; and -Warth & Klein
11/25/2015	3rd meeting of the Commission, Berlin Consultation with nuclear plant operators (EnBW, E.ON, RWE and Vattenfall)
12/1/2015	4th meeting of the Commission, Berlin Consultation with experts and members of the public
12/17/2015	4th meeting of the Commission, Berlin Consultation with experts and members of the public
1/11/2016	Excursion to Obrigheim to view dismantling of the nuclear power plant
1/12/2016	6th meeting of the Commission, Raunheim Consultation with the German Federal Bank, Discussion on findings to date and planned recommendations
2/12/2016	7th meeting of the Commission, Berlin Discussion on structure and content of the final report
2/23/2016	8th meeting of the Commission, Berlin Discussion on the draft report
2/26/2016	1st discussion between the Co-chairs and chief executives of the nuclear plant operators (EnBW, E.ON, RWE and Vattenfall), Berlin

2/29/2016	9th meeting of the Commission, Berlin Discussion on the draft report
3/22/2016	10th meeting of the Commission, Berlin Consultation with the experts from Warth & Klein, Discussion on the draft report
4/12/2016	2nd discussion between the Co-chairs and chief executives of the nuclear plant operators (EnBW, E.ON, RWE and Vattenfall), Berlin
4/13/2016	11th meeting of the Commission, Berlin Discussion on the draft report
4/25/2016	3rd discussion between the Co-chairs and chief executives of the nuclear plant operators (EnBW, E.ON, RWE and Vattenfall), Berlin
4/27/2016	12th meeting of the Commission, Berlin Resolution on the final report