1 Summary

The success of the energy transition depends on the expansion of the transmission network. A key basis for the expansion of the electricity grid is the German Energy Industry Act (EnWG), which was amended in 2011. The aim was to drive forward swift and sustainable expansion of the grid. A multi-stage process is used to find out where and how the transmission network needs to be expanded. The first process was begun in 2012.

A key part of the process of establishing requirements is the strategic environmental assessment (SEA). The SEA identifies, describes and evaluates the likely significant environmental effects associated with the grid expansion needed. Authorities and the public are also involved in the process.

In the years in which a network development plan (NDP) does not need to be presented, the transmission system operators (TSOs) must submit an implementation report. This report provides details of the progress in implementing the most recently confirmed NDP.[1]

This year's procedure focuses on establishing requirements for the target years 2021 to 2035. The results of the SEA are documented in this environmental report.

What does the SEA include?

What is the process of establishing requirements?

The basis for grid expansion planning is the "scenario framework". The scenario framework sets out the likely development in the energy sector. It has been used as the basis to identify grid expansion requirements since 2012 for the mainland in the NDP and since 2013 for coastal waters in the offshore network development plan (O-NDP). The four German TSOs TenneT TSO GmbH, Amprion GmbH, 50Hertz Transmission GmbH and TransnetBW GmbH draw up the NDP jointly, and the Bundesnetzagentur checks and confirms it.

The process of identifying requirements aims to ensure that only those projects that are really necessary for the energy industry and have been examined for their environmental impact are included in the Federal Requirements Plan. As of 2019, this process is no longer carried out annually but has been changed to a two-year process. Because of changes to legislation, the Bundesnetzagentur now provides the federal government with the plan at least every four years. The plan acts as a draft for the Federal Requirements Plan.

What is the purpose of the SEA?

Implementing plans like the Federal Requirements Plan has an impact on the environment and people. Environmental assessments aim to ensure that possible effects on the environment and people are taken into account when a plan or project is implemented. An SEA starts at the planning level and

1 See section 12d EnWG.

not when an individual project is already being implemented. The aim is for potential effects resulting from the expansion of the extra-high voltage transmission network to be identified when preparing the Federal Requirements Plan. The SEA thus acts as an early warning system.

Are alternatives examined?

An SEA must consider alternatives in order to effectively protect the environment. Only reasonable alternatives should be considered. This means alternatives must:

- be feasible;
- be practicable at a reasonable cost; and
- largely support the achievement of the plan's objectives.

Which projects are included in the Federal Requirements Plan also depends on other aspects, such as economic efficiency, which is not covered by the environmental assessment. As part of the approval of the Federal Requirements Plan, the legislature is required to consider all important aspects in combination and comparison with each other.

What is the environmental report?

The SEA identifies and evaluates the potential effects of the grid expansion on the environment. This environmental report describes these environmental effects.

Only potentially significant, that is likely severe, environmental effects on "protected assets" have been assessed. These protected assets are specified in the Environmental Impact Assessment Act (UVPG)[2] as:

- people, including human health[3]
- fauna, flora and biodiversity
- land, soil, water, air, climatic factors and landscape
- cultural heritage and other material assets
- interactions between the above protected assets.

What is the status of the current process of establishing requirements?

The scenario framework for the process of establishing requirements for the target years 2021 to 2035 was approved on 26 June 2020.[4] The TSOs launched a consultation on the first draft of the electricity NDP at the end of January 2021. They submitted the revised plans to the Bundesnetzagentur for evaluation on 26 April 2021. The Bundesnetzagentur is expected to confirm the NDP 2035 in December 2021.

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2 Section 2(1) UVPG

3 Also referred to below as "protected asset "humans"".

4 Bundesnetzagentur (2020)

The basis for the NDP is the scenario framework of 26 June 2020 that was drawn up by the TSOs and consulted on and approved by the Bundesnetzagentur. At the time when the scenario framework was approved, the German legislature had set certain sector-specific CO_2 mitigation targets in the Climate Change Act (KSG) of 12 December 2019; these targets were taken up in the scenario framework and implemented as a CO_2 cap for the power plants in the NDP for the target years 2035 and 2040. However, the German Bundestag passed a new version of the KSG on 24 June 2021. The stricter emission mitigation path in the new version has a direct influence on the permissible emissions of the conventional power plant pool in the NDP and on the future course of the energy transition overall. It results in a large reduction in the permissible emissions of the power plant pool in both target years. The Bundesnetzagentur will take full account of the change to the framework conditions in the upcoming process of establishing requirements, for which preparations have already begun with the TSOs' drafting of the scenario framework.

In order to identify grid expansion requirements that are as close as possible to the upcoming changes to the planning basis in the present process with the scenarios given, the focus in the energy-related examination of the NDP is placed on Scenario C 2035 (and Scenario B 2040), which are ambitious with respect to the expansion of renewable energy. Scenario C 2035 was used as the basis for the draft SEA.

The Bundesnetzagentur prepares a Federal Requirements Plan by carrying out an SEA based on the NDP. The SEA begins with a scoping exercise to define the methodology and level of detail for the assessment, among other things. The scope of the assessment was drafted with input from various public agencies. These agencies were primarily authorities whose environmental and health remits are affected by the NDP. Following this input, the scope of the assessment was defined and published in April 2021.[5] This is the basis on which the draft environmental report was drawn up. The draft is the subject of a consultation running from 9 August to 20 October 2021 with the participation of specialists and the affected general public.

The SEA will be adjusted with respect to the final confirmation of the measures, which are due to be presented at the end of 2021, taking account of the responses to the consultation. The SEA will take into consideration all the measures that are confirmed and are to be included in the Federal Requirements Plan Act (BBPlG).

What has the Bundesnetzagentur examined for the environmental report?

The likely development of the energy industry as a basis of the network development planning is laid down in the scenario framework using certain assumptions (including proportions of fossil and renewable energies, increase in photovoltaic and wind installations, and annual consumption). The scenario framework approved by the Bundesnetzagentur for the NDP 2035 includes a conservative scenario (A 2035), a transformation scenario (B 2035) and an innovation scenario (C 2035).

In the draft for this year's SEA:

5 Bundesnetzagentur (2019)

- 101 measures were assessed, comprising 76 overhead, 8 underground and 17 submarine/underground cable measures;
- in addition, there were spatial alternatives for 21 measures, which were compared with the TSOs' proposal variants.

- Because of the small differences between the networks in the scenarios, Scenarios A 2035, B 2035 and C 2035 were not presented separately as alternative overall plans this time round.

"Start network measures" were not assessed. These measures either have been implemented already, are in an ongoing planning approval procedure or their necessity has already been determined in the Power Grid Expansion Act (EnLAG). "Point measures", for example substations, were not assessed either. These measures are not part of the Federal Requirements Plan. They are therefore not covered by the SEA or the environmental report. Projects located in the exclusive economic zone (EEZ) of the North and Baltic Seas undergo an SEA carried out by the Federal Maritime and Hydrographic Agency (BSH) when the site development plan is drawn up.

How does the Bundesnetzagentur go about the environmental report?

The SEA examines where and to what extent potential environmental effects are likely. And it examines how far these environmental effects are viewed to be significant.

The methodology for the SEA comprises 8 steps. Steps 1 to 5 involve identifying the bases. Building on this, steps 6 to 8 involve deriving the results. Section **Fehler! Verweisquelle konnte nicht gefunden werden.** provides a detailed explanation of the improved methodology. The individual steps are outlined in brief below.

Step 1: identification of impact factors and environmental objectives (see section Fehler! Verweisquelle konnte nicht gefunden werden.)

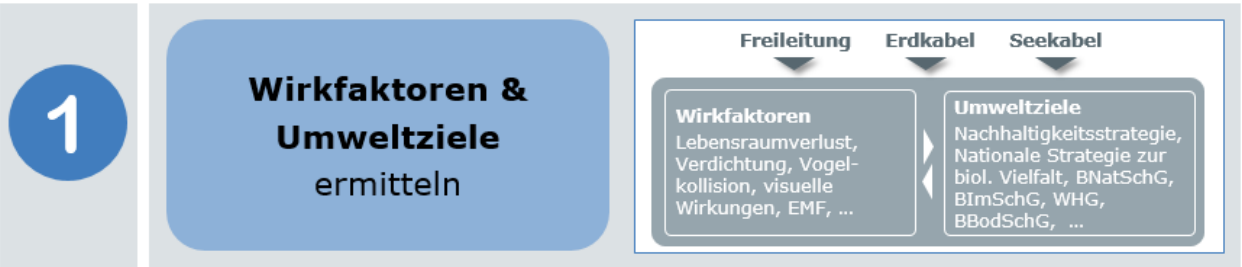


Figure 1: methodology step 1

The aim of the environmental report is to appraise possible effects of the grid expansion on the protected assets under the UVPG. The appraisal considers how and how strong the effects of the different types of implementation of the grid expansion (overhead, underground and submarine cables) are. These "impact factors" are first described in an abstract manner without reference to location. They are then evaluated with reference to the individual protected assets. For instance, the Bundesnetzagentur assesses the general effects of an overhead cable on the protected assets of fauna,

flora and biodiversity, such as damage to habitats. Section **Fehler! Verweisquelle konnte nicht gefunden werden.** provides details of the impact factors in Tables 5 to 7. A more detailed description of the possible effects of extra-high voltage cables can be found at www.plus.netzausbau.de (in German).

In order to be able to evaluate potential effects on the environment, the applicable environmental objectives are also assessed, from which the significance of the affected environment can be derived. Section **Fehler! Verweisquelle konnte nicht gefunden werden.** lists the environmental objectives. Further information on this can also be found in the SEA for the Federal Requirements Plan 2019-2030 at www.netzausbau.de/umweltbericht (in German).

Step 2: selection of site categories and identification of potential conflicts (see section Fehler! Verweisquelle konnte nicht gefunden werden.**)**

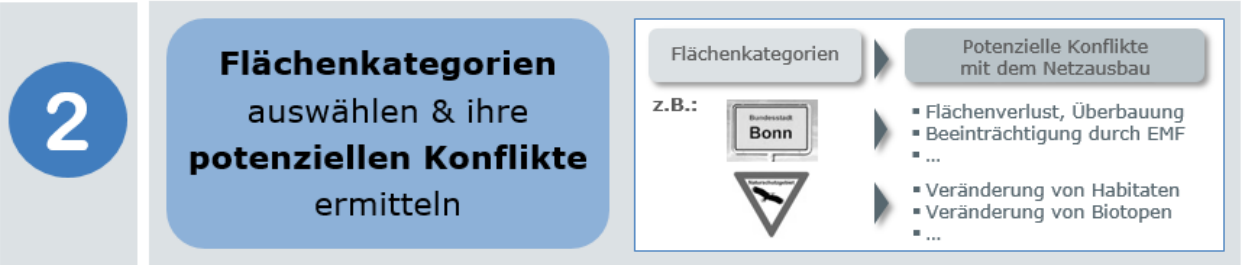


Figure 2: methodology step 2

The Bundesnetzagentur evaluates the likely significant environmental impact by trying to predict changes to the environment resulting from the grid expansion. The likely significant environmental effects are evaluated using the spatial environmental characteristics. The SEA for the Federal Requirements Plan looks at the whole country. Site categories (for example "nature conservation area") are used to indicate environmental characteristics at this abstract planning level.

The Bundesnetzagentur selects site categories that appropriately represent likely significant environmental effects. These site categories are based on national standardised and site-related data. The Bundesnetzagentur takes account of the impact factors of the grid expansion and environmental objectives when selecting the categories. (Step 1 describes how the impact factors and environmental objectives are identified.) Potential conflicts that could arise between environmental objectives and impact factors are identified for each site category. Each site category is assessed individually. Site categories usually represent several spatial and environmental characteristics relevant to conflicts. They can therefore also be used to represent several potential conflicts. For example, for the site category "floodplain" potential conflicts that may arise as a result of overhead cable measures include:

- disturbing and repelling sensitive animal species or
- changing habitats.

The SEA also takes account of sites with limited availability. These sites include raw material extraction areas and airports. They are only likely to be available for network expansion to a limited extent and may need to be avoided when subsequently planning routes. It may then be necessary to

use adjacent sites that might be just as sensitive or even more sensitive to the construction of a power line. Sites with limited availability may therefore affect power line construction planning, and the resulting environmental effects are therefore taken into account at an early stage.

Section **Fehler! Verweisquelle konnte nicht gefunden werden.** provides further details of the site categories in this SEA.

Step 3: assessment of potential conflicts (see section Fehler! Verweisquelle konnte nicht gefunden werden.**)**

Figure 3: methodology step 3

In the third step, the Bundesnetzagentur determines a conflict risk for each potential conflict in a site category. To do this, each potential conflict is rated using the following parameters:

- sensitivity
- significance and
- accuracy.

The sensitivity indicates how strongly an environmental characteristic reacts to the effects of different types of implementation. The reactions of the environmental characteristics are rated as:

- not particularly sensitive
- sensitive or
- highly sensitive.

Figure 22 provides further details of the ratings for sensitivity.

The significance is an estimate of the legal and social value of a site category. It is evaluated for a site category as a whole. The potential conflicts are evaluated individually. The significance is rated as:

- generally relevant
- relevant or
- highly relevant.

Figure 23 provides further details of how the significance is rated.

The accuracy represents how suitable a site category is for representing a potential conflict. It reflects the spatial and environmental characteristics and the associated conflicts of a site category in a way that is:

- very inaccurate (+)
- not very clear and accurate (++) or
- very clear and accurate (+++).

Figure 24 provides further details of this.

The individual parameters are first evaluated separately. The "sensitivity" and "significance" parameters are then merged into a conflict risk for each potential conflict using a matrix. The conflict risk for each potential conflict is lowered (++) or raised (+++) by one level according to the accuracy. If the accuracy is low (+), the conflict in question is not included in the evaluation any more. The conflict risk is categorised into one of four conflict risk classes:

- low
- medium
- high or
- very high.

The conflict risks of the site categories are evaluated separately for each type of implementation. The assessment tables of the site categories can be found in the annex "Description and assessment of site categories".

Step 4: derivation of the conflict risk for the site categories (see section Fehler! Verweisquelle konnte nicht gefunden werden.**)**

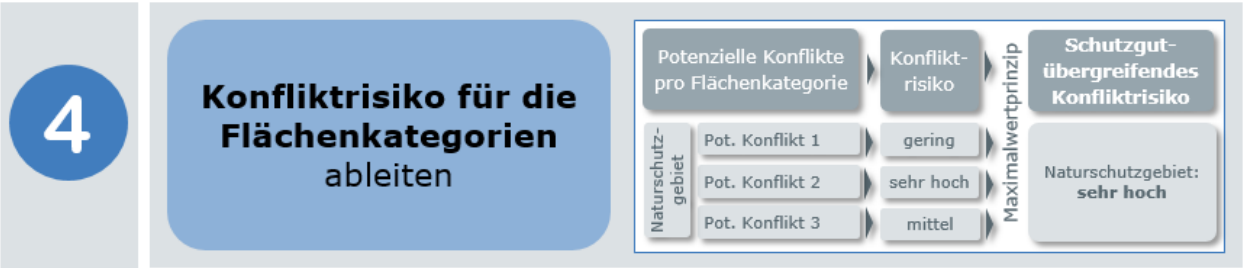


Figure 4: methodology step 4

One protected asset is allocated to each potential conflict risk of a site category. Conflict risks with the same protected asset are grouped together to determine a **conflict risk for each protected asset**. This is the highest conflict risk given to any of the potential conflicts in the group.

All the potential conflict risks of a site category are merged to produce a **conflict risk across all protected assets**.

The ratings can be found in the annex "Description and assessment of site categories".

Step 5: forming assessment areas for the measures (see section Fehler! Verweisquelle konnte nicht gefunden werden.)

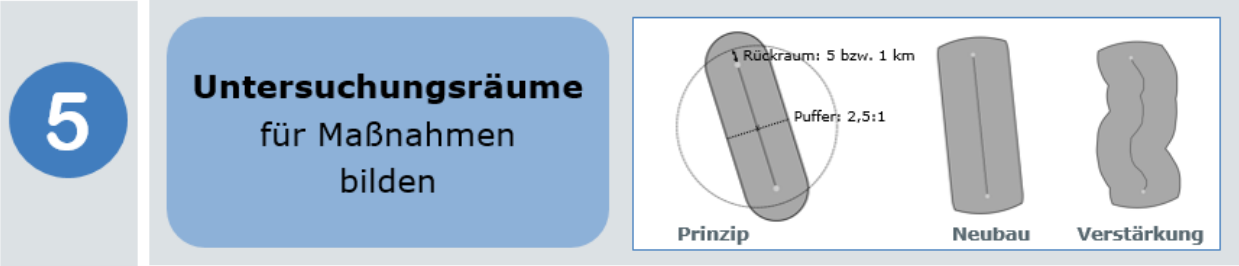


Figure 5: methodology step 5

Exactly where lines and routes will run is not decided on at the level of the Federal Requirements Plan. Only the grid connection points that have to be joined up are decided on. A way of delineating the assessment areas is therefore needed. For new build measures, the straight line between the grid connection points is surrounded by a buffer constructed using a length-to-width ratio of 2.5 to 1. For reinforcement measures, the line specified in the NDP 2035 is surrounded by a buffer in the same way. This means that assessment areas are constructed in the same way. Among other things, this prevents the design of the assessment area influencing the evaluation when comparing different types of implementation and forms of expansion. The areas behind each grid connection point, which are also taken into account, are calculated by forming a circle either around the mid-point of the straight line or, in the case of deviating lines to be reinforced between the grid connection points, around an auxiliary point. The circles have a maximum radius of 5 km.

Particular designs of the grid connection points require the assessment area to be adjusted. This applies to:

- measures with supports and/or search areas
- measures with an assessment area that touches a national border and
- offshore transmission links.

The principle described is, however, always followed as far as possible.

Environmental effects that cross the national border are not evaluated at this level. However, the Bundesnetzagentur notified the potentially affected neighbouring countries of the processes of establishing requirements and of the SEA. Denmark subsequently consulted its public authorities. The Danish authorities informed the Bundesnetzagentur on 20 January 2020 that they had no comments to make.

Step 6: survey of measures (see section Fehler! Verweisquelle konnte nicht gefunden werden.)

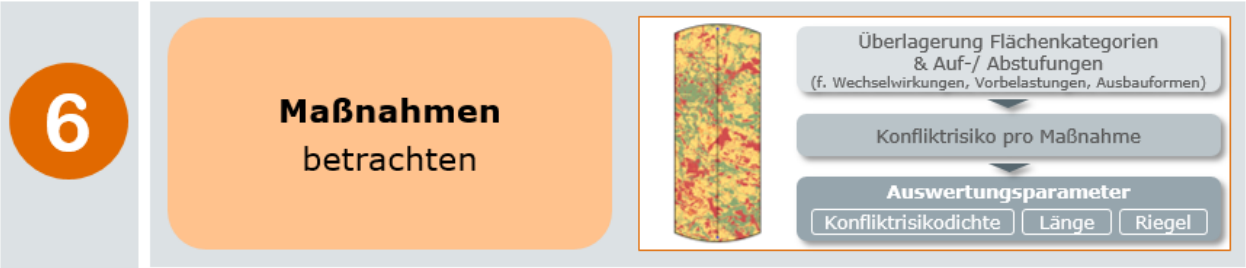


Figure 6: methodology step 6

The first step in the evaluation of the measures is to assess each measure individually. First the current state of the environment is described using the site categories. This is referred to as the "actual state". Then the likely significant environmental impact is identified and evaluated. The results are presented in fact sheets. The fact sheets provide information on:

- general characteristics of the measure such as:
  - location in the assessment area and
  - size of the assessment area; and
- the evaluation result of the measures and any partial evaluations undertaken.

The likely environmental impact of a measure is evaluated first for each protected asset and then across all protected assets.

A conflict risk density is calculated for the evaluation for each protected asset as follows. First the site categories with their conflict risk points in the assessment area are laid over each other on a map. Next the assessment area is divided up into 50 m by 50 m raster cells. Each raster cell is assigned the value of the conflict risk points of the site category in the cell. If there is more than one site category for a protected asset in a raster cell, the cell is assigned the highest value. The conflict risk points for each protected asset for all the raster cells in an assessment area are then added up. The conflict risk density for each protected asset is calculated by multiplying the sum of the conflict risk points by the size of the assessment area.

The evaluation across all protected assets is made using the following parameters:

- the conflict risk density across all protected assets
- the expected length of the measure and
- possible bars.

The conflict risk density across all protected assets is calculated as follows. The conflict risk points across all protected assets of the site categories in the assessment area are laid over each other on a map. The assessment area is divided up into 50 m by 50 m raster cells. Each raster cell is assigned the value of the conflict risk points across all protected assets of the site category in the cell. If there is

more than one site category in a raster cell, the cell is assigned the highest value of all of these categories. Account is taken of

- interactions
- existing impacts and
- expansion forms

in a raster cell by adding and deducting conflict risk points. Section **Fehler! Verweisquelle konnte nicht gefunden werden.** provides a detailed explanation of how interactions are taken into account. The conflict risk density across all protected assets is calculated by multiplying the sum of the conflict risk points for an assessment area by the size of the assessment area.

The expected length of a measure in the case of reinforcement measures is the length of the existing cable. The expected length in the case of new build measures is the length between the grid connection points "as the crow flies" multiplied by a "detour factor" of 1.3. This enables a comparison with the reinforcement measures.

The assessment area is then examined for bars. Bars are possible obstacles that have to be crossed. They result from areas with the highest conflict risk, where applicable in conjunction with sites of limited availability.

The next step is to combine the three evaluation parameters. Figure 25 illustrates the process. The result is the final rating for the likely significant environmental impact of the evaluated measure: very small, small, moderate, large or very large.

Further details about the fact sheets are provided in part IV of the environmental report.

Step 7: survey of the overall plan (see section Fehler! Verweisquelle konnte nicht gefunden werden.)

Figure 7: methodology step 7

The survey of the overall plan was conducted on the basis of the results of the environmental effects described and evaluated for the individual measures. The significant environmental effects are evaluated as a whole. They are also evaluated in connection with effects on the protected asset "land" and the interactions. These are not reflected in the site categories (see section **Fehler! Verweisquelle konnte nicht gefunden werden.**). The results of the surveys of measures are analysed as a whole. This makes it possible to also look at positive effects that are likely to arise when the plan is implemented, such as climate protection.

First the assessment area of the overall plan is formed. It comprises the individual assessment areas of the measures. The alternatives are not included. Then the actual state of the environment is described and the likely environmental impact assessed. This is done both for each protected asset individually and for all the protected assets together using the conflict risk density. The conflict risk density is put in relation to the Germany-wide conflict risk density to determine whether the conflict risk density in the potentially affected areas is average, above-average or under-average.

The overall plan is also evaluated with respect to:

- the total likely measure lengths of the types of implementation
- the total size of expected land take and
- the distribution of areas that would form bars in the overall plan.

Step 8: comparison of alternatives (see section Fehler! Verweisquelle konnte nicht gefunden werden.)

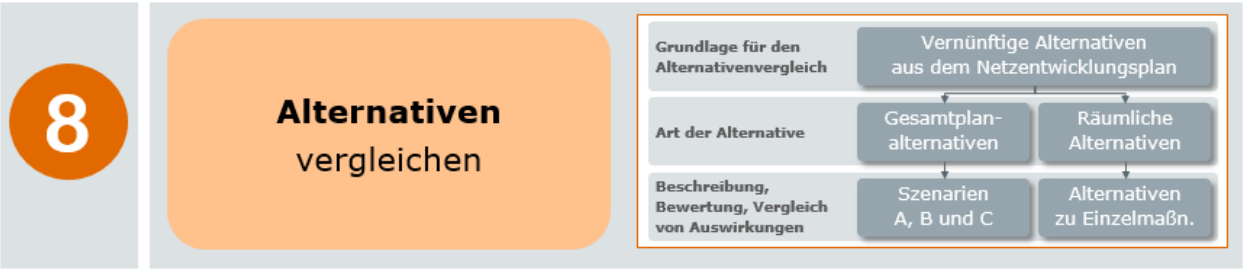


Figure 8: methodology step 8

Step 8 involves comparing the reasonable alternatives with each other. The NDP 2035 includes other planning options, or "alternatives", proposed by the TSOs for some of the measures. The planning preferred by the TSOs is the "proposal variant". The comparison of alternatives involves comparing the likely significant environmental impact identified for the

- proposal variant and
- other planning options

for a measure with each other. The results are documented in fact sheets. The proposal variants and other planning options are compared using the following criteria:

- conflict risk points
- conflict risk density
- expected length of the measure and
- bars.

The comparisons are used to give rankings. In the case of the conflict risk density, for example, the alternative with the lower conflict risk density is given rank 1 and the variant with the higher conflict risk density is given rank 2. The rankings for the alternatives are compared with each other. The alternative with the lowest ranking is preferable from the environmental perspective: it has the fewest

likely significant environmental effects. In this environmental report, a preference is only given for alternatives when there is a clear difference of at least two ranks from the comparative variants. The result is intended as a basis for the overall consideration to decide on the measures for the BBPlG.

The comparison of alternatives of the overall plan is based on Scenario C 2035 and the resulting grid expansion requirements: it takes account of the measures set out in Scenario C 2035 in the NDP 2035. The likely significant environmental effects of the measures are identified, described and evaluated. The individual evaluations are summarised in an overall plan survey. Overall plan surveys are also drawn up for Scenarios A 2035 and B 2035. As there are hardly any differences between the scenarios this time round, no detailed comparison of the scenarios is presented.

Consideration of the protected assets "land" and "interaction"

In contrast to the other protected assets, a different methodology is used for:

- the protected asset "land" and
- the protected asset "interaction".

Land

The protected asset "land" has been included in the UVPG since the adoption of the Directive amending the environmental impact assessment Directive.[6] It therefore needs to be taken into consideration in the environmental assessment. Section **Fehler! Verweisquelle konnte nicht gefunden werden.** provides further information on this.

Land used to be part of the protected asset "soil". Now the effects of quantitative land take are assessed for land as a protected asset:

- for each measure; and
- at the overall planning level.

The assessment is quantitative and based on characteristics for a defined area.

The qualitative aspect of land as a protected asset is also assessed: it is fully covered by the evaluation of the effects on the other protected assets. The different intensities of land take (for example temporary) are also included.

Interaction between protected assets

The SEA for the Federal Requirements Plan is very abstract. The overall evaluation of the measures and alternatives therefore only identifies and evaluates the increased conflict risks resulting from interactions between the protected assets. Section **Fehler! Verweisquelle konnte nicht gefunden werden.** provides further information on this.

6 Directive 2014/52/EU

There are interactions that occur regularly. These are already covered by the method for evaluating the conflict risks for the individual site categories. One example of an interaction expected to occur regularly is the interaction between the protected assets "soil" and "water".

As described in step 4, the conflict risks across all protected assets are identified for the site categories. All the protected assets and their interrelationships are assessed together and evaluated. The protected assets are divided into three groups to identify increased conflict risks resulting from interactions:

- abiotic protected assets
- biotic protected assets and
- anthropogenic protected assets.

This is illustrated in Figure 36. Each group comprises the protected assets between which interaction is expected to occur regularly.

Increased conflict risks are assumed given the following conditions:

- a site has protected assets that already have an increased conflict risk; an increased conflict risk has at least 3 conflict risk points;
- these protected assets are assigned to at least 2 different protected asset groups.

If both of the conditions are met, one conflict risk point is added to the total for the affected area.

The fact sheets give the size of the areas for which there is an increased conflict risk because of interactions between the protected assets.

What significant environmental effects are likely?

Effects of the overall plan

The Bundesnetzagentur assessed the likely significant environmental effects of the 101 measures contained in Scenario C 2035 in the second draft of the NDP. The measures comprise 76 overhead, 8 underground and 17 submarine/underground cable measures. The individual measures are each assessed in a fact sheet. The fact sheets can be found in part IV "Environmental report – detailed evaluation results".

The measures include 6 interconnectors. A cost-benefit analysis was carried out for these measures in the NDP 2035.

Figure 9 shows where in Germany the assessment areas for the measures assessed are located. It shows that all federal states are potentially affected by measures from the NDP 2035. The assessment area for the overall plan results from the individual assessment areas of the measures assessed. The individual areas range from about 2 km to 527 km in length and cover from a few hectares to several federal states.

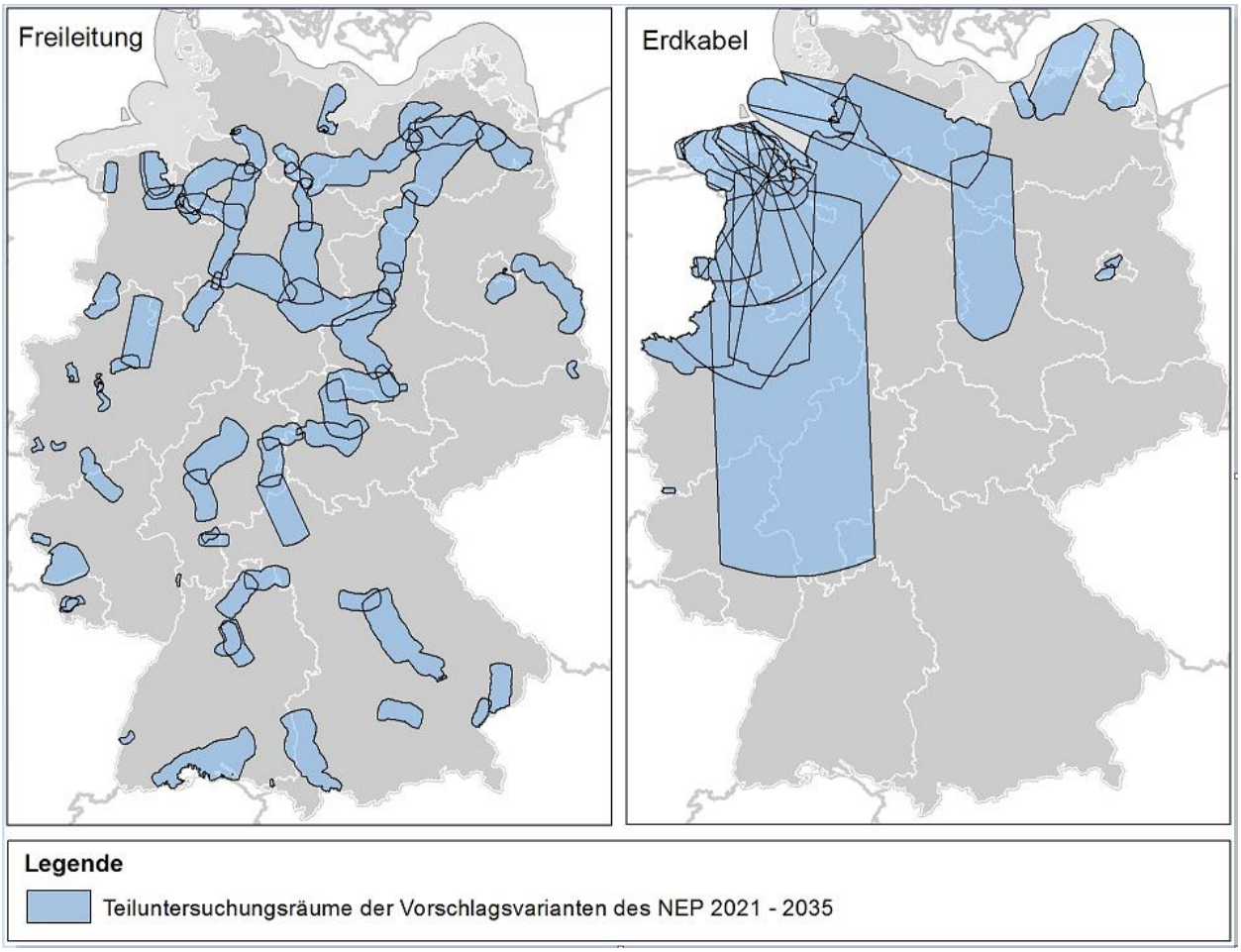


Figure 9: Assessment areas of overhead and underground/submarine cable measures

The following chart (Figure 10) shows a breakdown of the ratings for the environmental effects of all measures. The ratings are explained below.

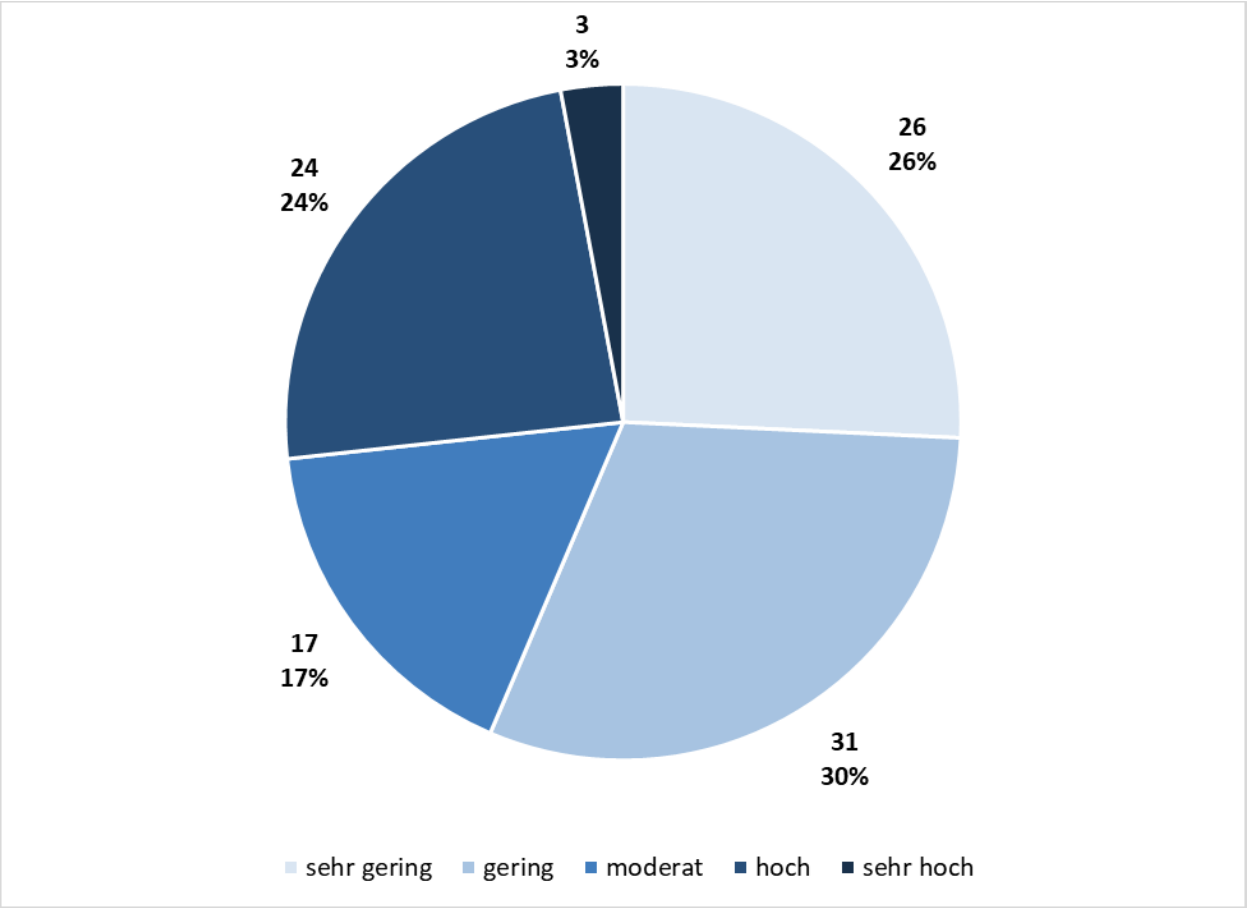


Figure 10: Breakdown of the evaluation of likely significant environmental effects of measures

For about 26 % of the confirmed measures, or 26 of the total 101 measures, significant environmental effects on the protected assets are likely on a very small scale with respect to the conflict risks identified, the expected measure length and the bar situation.

For about 30 % of measures, or 31 of the total 101 measures, significant environmental effects on the protected assets are likely on a small scale with respect to the conflict risks identified, the expected measure length and the bar situation.

For 17 measures or about 17 % of the total, significant environmental effects on the protected assets are likely on a moderate scale.

Meanwhile, for 24 of the 101 measures, and thus around 24 % of the total, significant environmental effects on the protected assets are likely on a large scale.

For 3 measures, or around 3 % of the total, significant environmental effects on the protected assets are likely on a very large scale.

Next the interactions between protected assets are evaluated. This results in an increased conflict risk over an area of 1,339,008 hectares in the overall plan. Figure 46 shows the areas with an increased conflict risk.

Finally the environmental impact of the overall plan is evaluated across all protected assets. The environmental effects of the individual measures are identified based on the:

- expected length of the measure
- conflict risk density and
- bar situation.

Figures 11 and 12 show the ratings of the measures for each type of implementation and where the measures are located in Germany.

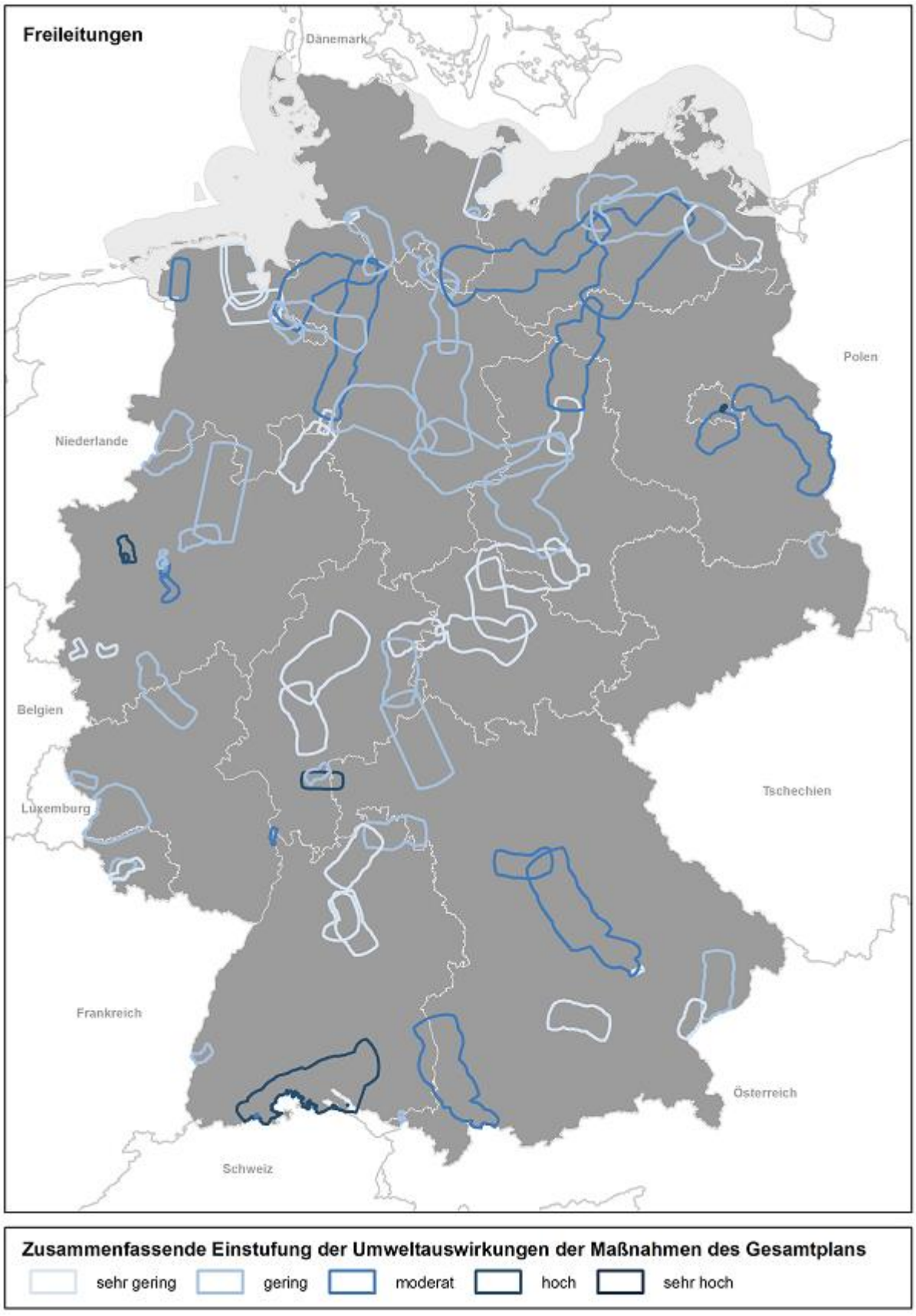


Figure 11: Results of the evaluation of the measures of the NDP 2035 across all protected assets pursuant to the UVPG (overhead cables)

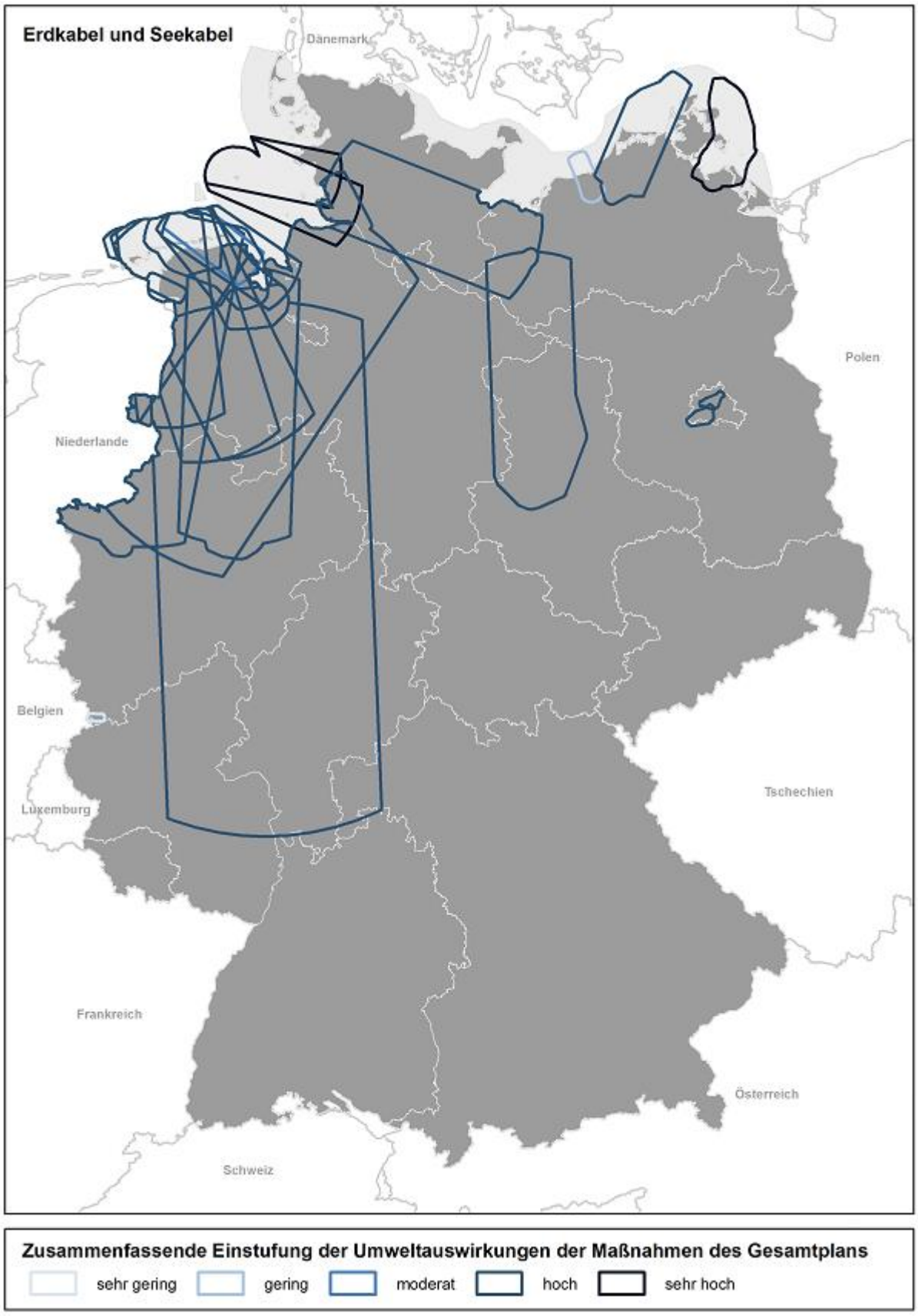


Figure 12: Results of the evaluation of the measures of the NDP 2035 across all protected assets pursuant to the UVPG (underground and submarine cables)

The overhead cable measures frequently have better ratings compared with the projects with underground cabling priority and offshore transmission links. This is due to the following reasons:

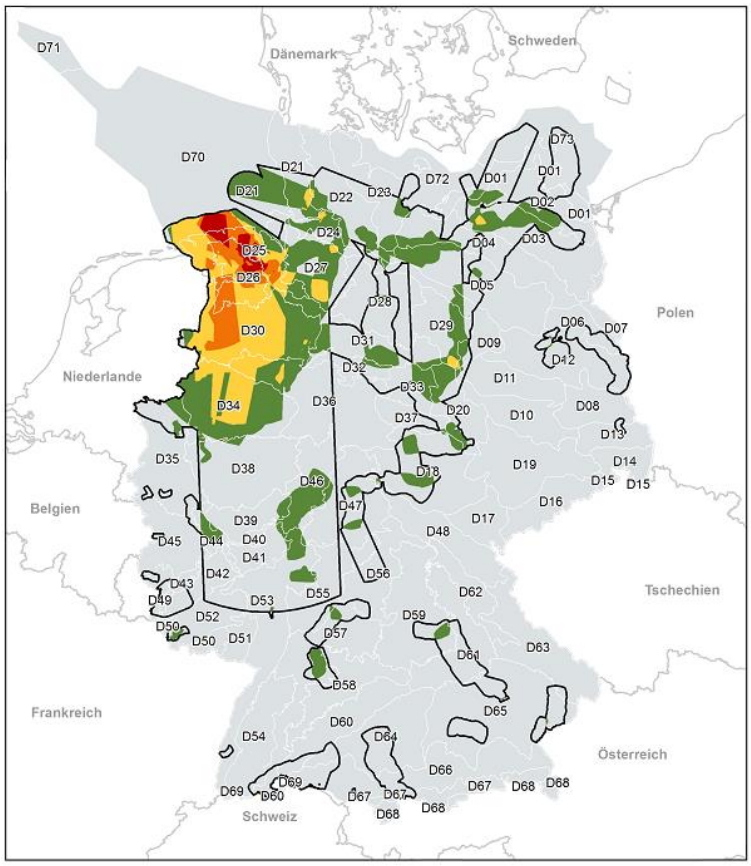
- Underground and submarine cable measures are generally longer than overhead cable measures, based on the distance between grid connection points.
- The conflict risk density calculated for underground and submarine cable measures is generally based on the whole assessment area. If overhead cables are planned as reinforcement measures, the conflict risk density of the "near zone" is used for the rating. This tends to be better because the conflict risk points are downgraded.

Cumulative effects

The overall plan has sites where the assessment areas and therefore the potential impact areas of the measures overlap. It is assumed that in these sites there is a greater probability of cumulative effects of the overall plan.

The assessment areas of overhead, underground and submarine cables overlap across an area totalling 6,343,839 hectares, corresponding to about 38 % of the total assessment area. There is a maximum of 12 overlaps of assessment areas.

Figure 13 shows where there may be cumulative effects on the nature areas in Germany. It also shows how the risk of the cumulative effects of the overall plan is rated.



Naturräume

D01 - Mecklenburgisch-Vorpommersches Küstengebiet
D02 - Nordostmecklenburgisches Tiefland mit Oderhaffgebiet
D03 - Rückland der Mecklenburg-Brandenburgischen Seenplatte
D04 - Mecklenburgische Seenplatte
D05 - Mecklenburg-Brandenburgisches Platten- und Hügelland sowie Luchland
D06 - Ostbrandenburgische Platte
D07 - Odertal
D08 - Spreewald und Lausitzer Becken- und Heideland
D09 - Elbtalniederung
D10 - Elbe-Mulde-Tiefland
D11 - Fläming
D12 - Mittelbrandenburgische Platten und Niederungen sowie Ostbrandenburgisches Heide- und Seengebiet
D13 - Oberlausitzer Heideland
D14 - Oberlausitz
D15 - Sächsisch-Böhmisches Kreidesandsteingebiet
D16 - Erzgebirge
D17 - Vogtland
D18 - Thüringer Becken und Randplatten
D19 - Erzgebirgsvorland und Sächsisches Hügelland
D20 - Mitteldeutsches Schwarzerdegebiet
D21 - Schleswig-Holsteinische Marschen und Nordseeinseln
D22 - Schleswig-Holsteinische Geest
D23 - Schleswig-Holsteinisches Hügelland
D24 - Unterelbeniederung (Elbmarsch)
D25 - Ems-Weser-Marsch
D26 - Ostfriesisch-Oldenburgische Geest
D27 - Stader Geest
D28 - Lüneburger Heide
D29 - Wendland und Altmark
D30 - Dümmer Geestniederung und Ems-Hunte-Geest
D31 - Weser-Aller-Tiefland
D32 - Niedersächsische Börden
D33 - Nördliches Harzvorland
D34 - Westfälische Tieflandsbucht
D35 - Kölner Bucht und Niederrheinisches Tiefland
D36 - Unteres Weserbergland und Oberes Weser-Leinebergland
D37 - Harz
D38 - Bergisches Land / Sauerland (Süderbergland)
D39 - Westerwald
D40 - Lahntal und Limburger Becken
D41 - Taunus
D42 - Hunsrück
D43 - Moseltal
D44 - Mittelrheingebiet (mit Siebengebirge)
D45 - Eifel und Vennvorland
D46 - Westhessisches Berg- und Beckenland
D47 - Osthessisches Bergland (Vogelsberg und Rhön)
D48 - Thüringisch-Fränkisches Mittelgebirge
D49 - Gutland (Bitburger Land)
D50 - Pfälzisch-Saarländisches Muschelkalkgebiet
D51 - Pfälzer Wald (Haardtgebirge)
D52 - Saar-Nahe-Berg- und Hügelland
D53 - Oberrheinisches Tiefland und Rhein-Main-Tiefland
D54 - Schwarzwald
D55 - Odenwald / Spessart und Südrhön
D56 - Mainfränkische Platten
D57 - Neckar- und Tauberland / Gäuplatten
D58 - Schwäbisches Keuper-Liasland
D59 - Fränkisches Keuper-Liasland
D60 - Schwäbische Alb
D61 - Fränkische Alb
D62 - Oberpfälzisch-Obermainisches Hügelland
D63 - Oberpfälzer und Bayerischer Wald
D64 - Donau-Iller-Lech-Platten
D65 - Unterbayerisches Hügelland und Isar-Inn-Schotterplatten
D66 - Voralpines Hügel- und Moorland
D67 - Schwäbisch-Oberbayerische Voralpen
D68 - Nördliche Kalkalpen
D69 - Hochrheingebiet und Dinkelberg
D70 - Deutsche Bucht (ohne Felssockel Helgoland)
D71 - Doggerbank und angrenzende zentrale Nordsee
D72 - Westliche Ostsee
D73 - Östliche Ostsee

Figure 13: Evaluation of the risk of cumulative effects of the overall plan in nature areas

The risk of cumulative effects of the overall plan is rated as high if 7 to 9 assessment areas overlap. This is the case in parts of the following nature areas:

- Ems-Weser-Marsch (D25)
- Ostfriesisch-Oldenburgische Geest (D26)
- Dümmer Geestniederung und Ems-Hunte-Geest (D30) and
- Deutsche Bucht (excluding Felssockel Helgoland; D70).

The risk of cumulative effects of the overall plan is very high in parts of the following nature areas:

- Ems-Weser-Marsch (D25)
- Ostfriesisch-Oldenburgische Geest (D26) and
- Deutsche Bucht (excluding Felssockel Helgoland; D70).

More than 10 assessment areas overlap here.

Connection with other evaluations (Natura 2000 assessment)

The projects in the Federal Requirements Plan can potentially affect Natura 2000 areas. The SEA therefore examines if the Federal Requirements Plan is compatible with Natura 2000 areas in a Natura 2000 assessment. This assessment is appropriate for the planning stage of the Federal Requirements Plan. It examines whether Natura 2000 areas are potentially affected in the assessment areas. This is described in section **Fehler! Verweisquelle konnte nicht gefunden werden.**. Next the environmental report identifies whether Natura 2000 areas form a "bar". Bars definitely need to be crossed when implementing a measure. The fact sheets state whether such bars exist.

The Natura 2000 assessment indicates the following potential effects on Natura 2000 areas:

- a total of 3,043,082 hectares of Natura 2000 areas are located within the total assessment area, corresponding to around 18 % of the total assessment area;
- in the total assessment area, 39 of the 101 measures have bars due to Natura 2000 areas.

The subsequent planning levels examine whether the bars or the areas likely to be affected will actually result in a significant impact on Natura 2000 areas, taking account of conservation objectives and preventive and reduction measures.

Comparison of alternative measures

The draft environmental report included a comparison of the environmental impact of spatial alternatives for 21 measures. The assessment of the alternatives for specific measures was based on the alternative planning options proposed by the TSOs in the second draft of the NDP 2035 that the Bundesnetzagentur identified as "reasonable alternatives" and "not obviously unlikely".

The Bundesnetzagentur compared the alternatives using 4 comparative parameters for the environmental effects. All of the benchmarks identified are included in the relevant fact sheets for the "Presentation and evaluation of measures" (see part IV) and in fact sheets for the "Comparison of alternatives" (see part IV no 4).

Figure 14 summarises the results of the comparison of alternatives to provide a better overview. This makes it easier for them to be taken into account when deciding on the acceptance of/amendment to the Federal Requirements Plan. The alternatives that are preferable from an environmental perspective are marked with the symbol ▲. Alternatives that are clearly worse are marked with the symbol ▼. There are better alternatives to these from an environmental perspective, even if it was not possible to identify a single preferable alternative in the comparison. No preference has been identified for the other alternatives.

Proposal	Alternative planning options according to NDP 2035		
Project no 48 BBPlG: extra-high voltage line Heide/west – Polsum			
DC25: Heide/west – Elbe crossing – Polsum	DC25 mod: Segeberg district – Polsum		
DC34: HVDC line from Lower Saxony to Hesse			
DC34: Ovelgönne/Rastede/ Wiefelstede/Westerstede – Bürstadt	DC34 mod: Ovelgönne/Rastede/ Wiefelstede/Westerstede – Rommerskirchen		
Project no 38 BBPlG: extra-high voltage line Dollern – Elsfleth/west			
M20: Dollern – Alfstedt – Farge – Elsfleth/west	M20 mod: Dollern – Samtgemeinde Sottrum – Elsfleth/west		
Project no 57 BBPlG: Dollern – Grafschaft Hoya – Ovenstädt – Eickum – Bechterdissen			
M206: Dollern – Samtgemeinde Sottrum – Mehringen – Point Landesbergen (Steyerberg) ▲	M206 mod: Dollern – Elsfleth/west – Ganderkeseee – St. Hülfe – Ohlensehlen – Landesbergen		
P221: 2nd expansion stage Hansa PowerBridge (HPB II)			
M461a: Sanitz/Dettmansdorf – Sweden (Hansa PowerBridge II)	M461a mod1: Güstrow – Sweden (Hansa PowerBridge II) ▼	M461a mod2: Bentwisch – Sweden (Hansa PowerBridge II)	M461a mod3: Lüdershagen – Sweden (Hansa PowerBridge II)
P355: network reinforcement Neuenhagen – Heinersdorf – Eisenhüttenstadt – Preilack			
M599: Neuenhagen – Heinersdorf – Eisenhüttenstadt – Preilack	M599 mod: Neuenhagen – Ragow		
P367: increase in interconnector capacity between Germany and the Netherlands			

M714: Emden/east – German border (Netherlands)	M714 mod: Emden/east – Diele – German border (Netherlands)		
P402: grid expansion Westerkappeln – Gersteinwerk			
M602: Westerkappeln – Gersteinwerk	M602 mod: Westerkappeln – Neuenkirchen/Stein- furt/Wettringen		
Project no 64 BBPlG: extra-high voltage line Hattingen – Linde			
M603: Hattingen – Schwelm – Ronsdorf district (Wuppertal)	M603 mod: Hattingen – Eiberg – Opladen		
Project no 71 BBPlG: extra-high voltage line Trier-Saarburg rural district – German border (Luxembourg)			
M606: Trier-Saarburg rural district – German border (Luxembourg)	M606 mod: Niederstedem – German border (Luxembourg)		
P408: grid reinforcement central Ruhr region			
M621/622/744: Emscherbruch – Hüllen – Eiberg and Bochum – Hattingen	M621/622/744 mod: Kusenhorst – Emscherbruch – Pöppinghausen – Witten – Hattingen		
P500: grid reinforcement and expansion Somborn – Aschaffenburg – Urberach			
M737: (Somborn –) Aschaffenburg – Urberach	M737 mod: Freigericht/Alzenau town (–Großkrotzenburg) – Urberach ▲		
P501: grid reinforcement Gersteinwerk – Lippe – Mengede			
M740: Gersteinwerk – Lippe – Mengede ▲	M740 mod: Uentrop –Kruckel		
P503: grid reinforcement Niederrhein – Walsum			
M742: Niederrhein – districts Walsum/ Hamborn (Duisburg) – Walsum	M742 mod: Niederrhein – Zensenbusch – Walsum ▲		
OST-1-4: AC transmission link OST-1-4			
M73: Baltic Sea Cluster 1 – border corridor O-I – Brünzow/Kemnitz	M73 mod: Baltic Sea Cluster 1 – border corridor O-I – Lüdershagen		

	▲		
OST-T-1: AC transmission link OST-T-1 (test field)			
M85: Baltic Sea test field (Zone 1) – Papendorf municipality	M85 mod: Baltic Sea test field (Zone 1) – Bentwisch		
NOR-9-1: DC transmission link NOR-9-1 (BalWin1)			
M234: North Sea Cluster 9 – border corridor III – Unterweser	M234 mod: North Sea Cluster 9 – border corridor III – Friesland rural district/Wilhelmshaven town ▲		
NOR-10-1: DC transmission link NOR-10-1 (BalWin2)			
M231: North Sea Cluster 10 – border corridor III – Unterweser	M231 mod: North Sea Cluster 10 – border corridor III – Friesland rural district/Wilhelmshaven town ▲		
NOR-12-2: DC transmission link NOR-12-2 (LanWin2)			
M233: North Sea Cluster 12 – border corridor III – Ovelgönne/ Rastede/ Wiefelstede/Westerstede	M233 mod: North Sea Cluster 12 – border corridor III – Friesland rural district/Wilhelmshaven town ▲		
NOR-13-1: DC transmission link NOR-13-1 (LanWin5)			
M43: North Sea Cluster 13 – border corridor V – Heide/west	M43 mod1: North Sea Cluster 13 – border corridor V – Brunsbüttel	M43 mod2: North Sea Cluster 13 – border corridor V – Segeberg district ▼	
NOR-X-1: DC transmission link NOR-X-1 (Zone 4)			
M248: North Sea Zone 4 – border corridor III – Ovelgönne/ Rastede/ Wiefelstede/Westerstede	M248 mod: North Sea Zone 4 – border corridor III – Friesland rural district/Wilhelmshaven town ▲		

Figure 14: Overview of comparison of alternatives for specific measures

Alternative overall plans

Overall there are only very small differences between Scenarios A 2035, B 2035 and C 2035 in the second draft of the NDP 2035.

According to the second draft of the NDP, there are:

- 97 measures in Scenario A 2035;

- 98 measures in Scenario B 2035; and
- 101 measures in Scenario C 2035.

Figure 82 shows the assessment areas of the scenarios.

Figure 15 shows a breakdown of the ratings for each individual scenario. The breakdown also shows that there are hardly any differences between the scenarios, which is why no detailed comparison of the scenarios is presented.

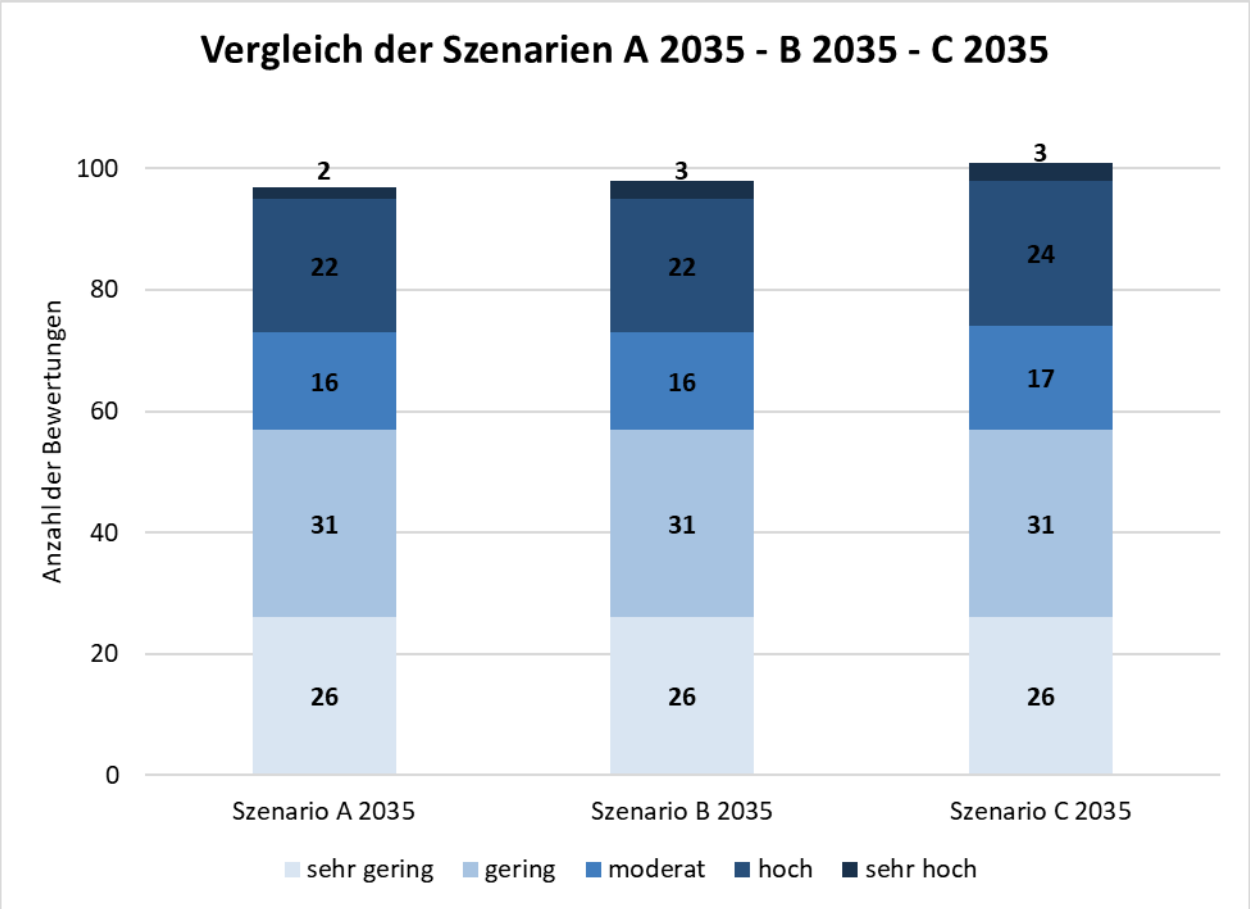


Figure 15: Comparison of overall evaluations for Scenarios A 2035, B 2035 and C 2035