Technical support for RES policy development and implementation – Simplification of permission and administrative procedures for RES installations (RES Simplify)

Germany

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Executive summary

With more than 140 TWh of electricity generation, onshore wind energy is expected to produce the bulk of Germany's electricity in 2030. The technology is followed by solar energy (90 TWh) and offshore wind energy (80 TWh), that are also thought to contribute significant shares to future electricity generation.

While offshore wind energy is regulated in a centralised manner on the federal level, onshore wind and ground-mounted PV systems (GMPS) are subject to differing regulation on the federal state (*Bundesland*) level. Even though project developers of GMPS need to invest more energy in site selection than onshore wind developers, while the latter more frequently need to address public opposition to their projects, the two technologies follow similar strands of project realisation. Therefore, their findings are presented together in the second part of this report, following an independent section for offshore wind energy.

Onshore wind. A legal analysis criticises that wind energy is very much dependent on regional land use planning and thereby discriminated against other constructions of public interest such as highways or railways (Günther and et al., 2020). This barrier becomes a particular impediment in regions without a land use plans or with strict distance requirements that are based on the height of the wind onshore plant (such as in Bavaria). Distance requirements for radar zones and other civil or military air safety requirements constitute a restricting factor for wind park site selection (*Drehfunkfeuer)*. More than 1,000 wind energy projects with over 4,800 MW are not realisable due to restrictions for radar zones and more than 900 projects of 3,600 MW blocked by interests of military airspace use (FA Wind and BWE, 2019). Moreover, administrative processes have become highly time intensive (up to 24 months for onshore wind project development). Other serious impediments are conflicts with environmental concerns either during the EIA process or conflicts with nature protection groups. Experts underline the positive effects of early, thorough inclusion of nearby citizens in energy projects, both in the decision-making process but also in economic terms, e.g., through energy cooperatives, to avoid that initial concerns turn into lengthy lawsuits. Moreover, another proposal brought forward concerns the free access of data of species monitoring to enable early evaluation of environmental concerns of sites.

GMPS. Since several years, project developers lament the increasing difficulty of finding available development areas. One major obstacle is the increasing overload of rural communities, which have typically small administrative structures, by project firms offering to develop GMPS in their community. Moreover, GMPS on arable land are generally excluded from receiving remuneration under the Renewable Energy Act in order to avoid land competition between the two existential fields of agricultural and energy production. This reduces the available area for building solar PV installations and causes distortion of competition in cross-border tenders for solar PV. Reacting to this bottleneck, German States make use of a permission to deviate from the Federal Rule at State Level (*Länderöffnungsklausel*) allowing them to increase the volume of solar installations built on arable land in specifically defined disadvantaged regions.

Offshore wind. Germany's one-stop-shop design for offshore wind energy defines two independent authorisation processes for the wind park and its respective grid connection, both to be granted by the Federal Maritime and Hydrographic Agency (BSH). Overall, the current legal regime for Germany's offshore development constitutes a structurally well-designed framework that addresses delays in offshore grid connection development in the previous system. An expert described the timely development of the offshore-

onshore connection nodes at the coast as well as the grid development in the coastal water zone as the current central challenge to Germany's offshore development plans.

Table 1 contains a traffic light assessment of the relevant process steps for the installation of offshore wind, onshore wind, and ground-mounted PV systems in Germany.

PV rooftop. In comparison to the other examined technologies, the administrative and grid connection process for PV rooftop systems is generally less burdensome. In most cases, a formal building permission process is not required at all and usually, grid operators foresee a specific process for small rooftop PV systems. The main barriers seem rather connected to corporate legal-fiscal issues, when operators of smaller rooftop PV systems need to deal with mandatory memberships to industry chambers or taxing rules.

Table 1 contains a traffic light assessment of the relevant process steps for the installation of offshore wind, onshore wind, rooftop PV and ground-mounted PV systems in Germany.

Table 1: Traffic light assessment of the relevant process steps

Process step	Site selection	Electricity production license	Application preparation process	Administrative authorisation	Grid connection permit	Corporate legal-fiscal	Other
Onshore wind							
PV ground-mounted							
Offshore wind							
PV rooftop							

No barriers identified
Moderate barriers identified
Minor barriers identified
Not relevant for target country
Severe barriers identified
No projects implemented

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1. National RES targets and relevant RES technologies

In Germany's National Energy and Climate Plan technology-specific targets for 2030 are listed as physical capacity and production goals. Onshore wind is foreseen with a volume of 140 – 145 TWh of electricity generation and a 67 – 71 GW production capacity. It is followed by solar PV systems accounting for 90 TWh electricity generation and 98 GW production capacity. Offshore wind energy shall produce 79 – 84 TWh of annual electricity, with a capacity of 20 GW (BMWi, 2019).Furthermore, bioenergy is expected to deliver 42 TWh and possess a capacity of 8.4 GW, while hydropower and other renewable energy sources might only amount to 21 ThW with a 6 GW capacity (BMWi, 2019). In 2019, production capacities of onshore wind amounted to 50.3 GW or 23.5% of Germany's total electricity production capacity, followed by solar energy with 42.3 GW or 19.8%. Offshore only amounts to 5.4 GW or 2.5%, presupposing a strong incline of net capacity to meet the 2030 targets (Bundesnetzagentur, 2019).

Figure 1 displays the annual deployment of PV and onshore/offshore wind between 2010 and 2019. While the wind power deployment took constantly place during the last decade with a peak between 2014 and 2017 and a more unstable deployment since then, the PV deployment decreased since the beginning of the 2010's and is slowly recovering since 2017.

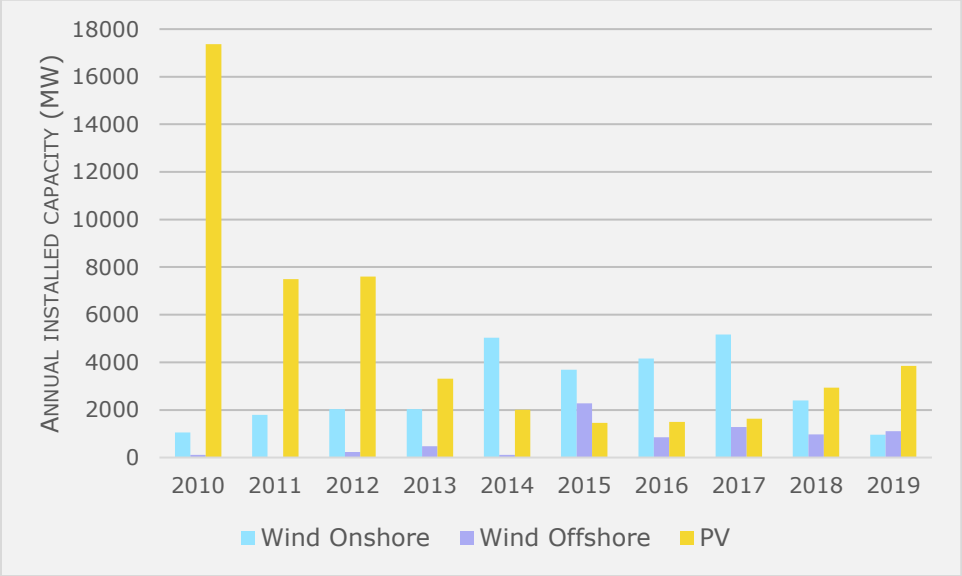

Figure 1: Annual installed capacity of PV and Wind onshore 2010-2019 (source: EurObserv'ER)

On the basis of both, the expected share of actual electricity generation in 2030 as well as production capacities, onshore wind, ground-mounted PV systems and offshore wind energy are selected as technologies to be investigated in this report. Due to the Federal structure of Germany, the nature of many administrative processes is set by State legislation. Therefore, this report investigates the German States of Lower Saxony (*Niedersachsen*) (largest capacity of onshore wind) and Bavaria (Bayern) (largest capacity of PV systems) as case studies for State-specific regulations (BMWi, 2018). Legislation for offshore wind deployment is Federal competence (WindSeeG, 2020), with the exception of a 12 nautical mile wide coastal zone that falls under State jurisdiction and follows the respective procedures of onshore wind (BMWi, 2020a).

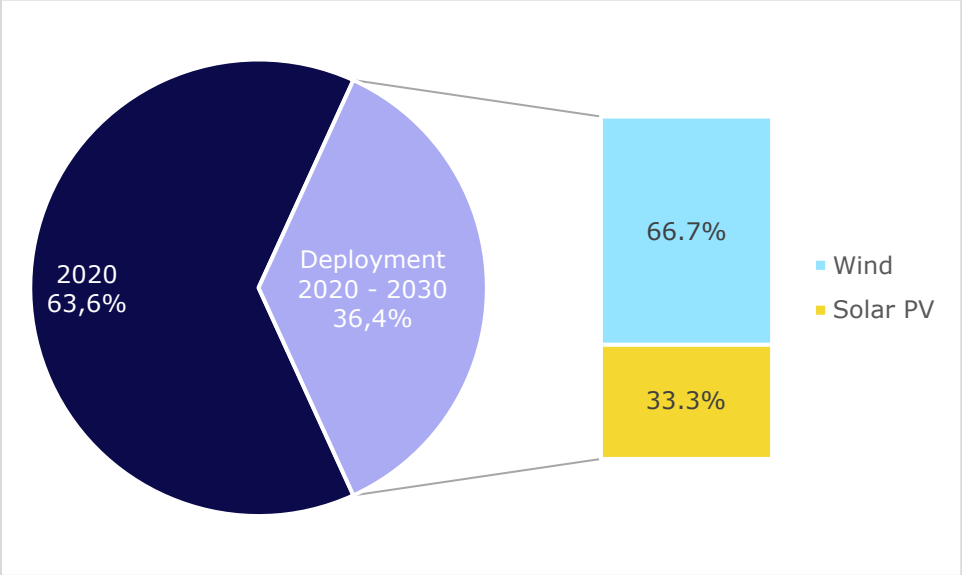

Figure 2: Planned deployment of RES-E 2020-2030 in relation to past deployment (source: NECP)

2. Administrative and grid connection procedures

2.1. Onshore wind, ground-mounted and rooftop PV

2.1.1. Relevant process steps

The realisation of onshore wind parks and ground-mounted photovoltaic systems (GMPS) projects in Germany starts with a) the planning and site acquisition, followed by b) the authorisation procedure and the grid connection application, c) the auctioning of public premiums and d) the construction phase. With one phase constituting the reach of approval of requirements for the subsequent procedures, their order is a logical consequence (Honnen, 2020).

Offshore projects within 12 nautical miles of the German coast (*Küstenmeer*) are not subject to the authorisation procedure for offshore wind parks but follow the rules of onshore wind authorisation processes (Wind Harmony Database, 2020). This is a consequence of the United Nations Convention on the Law of the Sea (1982) and the German Federal State organisation, a legal expert explains (Prall, 2021). Therefore, all subsequent descriptions of onshore wind authorisation processes also apply for them.

2.1.1.1. Site selection

Process flow

Onshore wind

Onshore wind energy projects are typically only realised on areas especially designated in spatial planning strategies. In Germany, they are regional competence. The state analysed in this report, Lower Saxony, requires planning strategies to be developed on a regional level (42 *Landkreise*) (Umweltbundesamt, 2019).

Regional planning considers a variety of interests, among them minimum distance requirements to residential areas and traffic infrastructure, protected areas and habitat

protection as well as military zones, airports and landmarked buildings (FA WindFA Wind, 2019). Federal Law, however, limits distance requirements to residential area to a maximum of 1,000 meters, with the States to define their regulation within that range (§249 BauGB, 2020). State-wide integrated coastal zone management defines wind energy development areas at the coast up to 12 nautical miles into the sea (BMWi, 2020a). Beyond legal criteria, site selection depends on technical suitability, public acceptance and land availability, with average process lengths of 14 months (FA WindFA Wind, 2015). Areas may be purchased or rent.

After a potentially adequate site has been identified on this basis, eventually existing requirements of a municipal land use plan (*Flächennutzungsplan*) or a local development plan (*Bauleitplanung)* for the specific site need to be reviewed. If no such plans exist, onshore wind energy is generally allowed on a site (§35-3 BauGB, 2020). However, the risk remains that the municipality amends existing land use plans banning wind energy from certain site. Indeed, industrial interest groups lament that 40% of regional planning strategies and 60% of existing land use plans are changed or annulled during the application preparation process, requiring projects to adapt existing plans throughout their planning process (FA Wind, 2015). It is therefore advisable for project planners to contact municipal authorities and convince them to adapt plans to specifically allow for wind energy development (FA WindFA Wind, 2019).

Ground-mounted PV systems (GMPS)

Contrary to the legally privileged status of onshore wind energy in spatial planning, GMPS may only be constructed on areas designated for solar energy production (labelled as *Sondergebiet Solar*) in the local land use plan (*Flächennutzungsplan*). Consequently, all ground-mounted solar PV projects need to find their site designated in the local development plan (*Bauleitplanung)* of the competent municipality (*Gemeinde*) (BauGB, 2020; §32 EEG, 2020).

The local development plan helps consider the project‘s spatial and environmental effects (§2 BauGB, 2020). Its amendment shall include a public consultation of citizens and public authorities such as the competent environmental agency of the district level (§3 BauGB, 2020).

To avoid conflicts of interest between energy generation and agriculture, German federal law constrains financial support to plants on certain areas (§37 and §48 EEG 2020), attempting to stir GMPS development towards these areas. These are sealed areas (e.g., streets, landfills, etc.), conversion areas (e.g., former military area), areas within a 110-meter distance to motorways or railways and agriculturally-disadvantaged areas as defined by State law.

Rooftop PV systems

The selection of the site for a rooftop PV system is usually predetermined by the roof where the PV system is installed. For this reason, the process step of the site selection simply consists of an on-site meeting with a PV installer to analyse the local circumstances.

Deadlines

No deadlines related to this process step were identified.

Detected barriers

Onshore Wind

Missing legal public interest. A legal analysis criticises that wind energy is very much dependent on regional land use planning and thereby discriminated against other constructions of public interest such as highways or railways (Günther and et al., 2020). The investigation came to the conclusion that there is a need for a federal law for onshore wind deployment in analogy to the already existing federal law for offshore wind deployment (ibid.).

From the perspective of the authoring lawyers, this could be realised by legally defining the development of onshore wind energy a public interest in the light of the national climate protection law (*Bundesklimaschutzgesetz* KSG) and Germany's international obligations of the EU climate protection laws (ibid.). Such a regulation would alleviate some of the current pressures on the energy's deployment by formulating a public interest in onshore wind development. Advocates further propose a national need assessment of development sites (*Bundesbedarfsplanung*) to set binding site reservation targets for federal states of approximately 2% of Germany's total area (Günther and et al., 2020; Honnen, 2020; Stiftung Klimaneutralität, 2021).

Related to this, also solar industry representatives articulate their desire for a more coherent legal body that replaces today's complex portfolio of different relevant legal sources that reference themselves interchangeably (Sonnen GmbH, 2020).

Air safety requirements. Distance requirements for radar zones and other civil or military air safety requirements constitute a restricting factor for wind park site selection (*Drehfunkfeuer)* (FA Wind and BWE, 2019; Endell, 2020; Public Servant, 2021). A nation-wide survey found more than 1,000 wind energy projects with over 4,800 MW not to be realisable due to restrictions for radar zones and more than 900 projects of 3,600 MW blocked by interests of military airspace use (for radar, helicopter corridors and air force manoeuvrability) (FA Wind and BWE, 2019).

The wind energy industry and the military have initiated a dialogue on the issue and progress has been made. One attempt to ease the conflicting interests is currently evaluated (BWE, 2021): Certain wind parks can be turned off remotely; the scalability of this measure, however, is still unclear.

Another aspect of the problem is the proximity of wind power plants to civil radar stations, for example those of meteorological services or civil aviation. Cooperation with the German air traffic control and the German weather service proves to be more difficult and constitutes a more serious barrier. The distance rules of the German air traffic control are significantly higher than the international standard (RNP, 2020).

A consulted public servant explained that these authorities often have very limited resources available to assess individual project applications in parallel to their primary responsibilities, which causes delays in administrative authorisation processes (Public Servant, 2021; see section 2.1.1.2.). Moreover, the comparably restrictive legal situation in Germany (typically a 15km range ban for wind turbines from sensitive sites) invites risk-adverse decisions, that leave authorities on the legally safe side (Honnen, 2020; Public Servant, 2021). Adopting the international distance standards would make more land available to wind energy development (Honnen, 2020).

Attempts to anticipate suitability of areas and provide a map of useable sites have been made in the Federal State of Hessen (where the airport of Frankfurt constitutes a major factor of air traffic), the public servant explains, but were in vain: Decisions have to be

taken on a case-by-case basis depending on the exact technical specifications of the turbines and the arrangement of the entire wind park (Public Servant, 2021).

Land use development processes. Another barrier stems from the lengthy process of regional land use plans, which is federal state competence. Due to mandatory public participation, the development processes can take various years and hence slow down site selection for wind park projects, industry advocates lament (RNP, 2020).

A representative of an environmental NGO, however, emphasises the significance of qualitatively high regional planning as one of the highest leverage potentials to reconcile environmental protection and deployment of renewable energy sources by preventing the rise of conflicts of interest beforehand (Wessel, 2020).

Overall, a consistent energy production strategy on the federal level that includes the dimensions of energy efficiency and sufficiency alongside supply and demand would be desirable, an environmental expert suggests (Wessel, 2020). This could work as a reference to assess the required scope of land zoning on a federal state level and would ease environmental pressure by capping overall deployment of energy production (Wessel, 2020).

General minimum distance regulations and environmental protection. Environmental organisations object general minimum distance regulations as studies show them to be ineffective to increase public acceptance while at the same time causing a spatial dispersion of project deployment into previously unaffected landscapes (BUND Naturschutz in Bayern e.V., s.a.). Also, they criticise the untransparent decision-making practice of flight protection agencies as another obstacle to far-sighted, comprehensive spatial planning efforts (ibid.). Moreover, environmental organisations demand that national parks and reserves as well as designated Natura 2000 areas should generally be exempt from wind power plant deployment to minimise negative effects on nation-wide conservation efforts (BUND Naturschutz in Bayern e.V., s.a.).

Ground-mounted PV systems (GMPS)

Land availability. Since several years, project developers lament the increasing difficulty of finding available development areas for various reasons (Brühl, 2021; PV Grid Consortium, 2016). Naturally, just as experienced with onshore wind, a strong growth phase is followed by increasing conflicts of interests, an industry representative explains but outlines alternative factors that make further development harder (Brühl, 2021). One major obstacle is the increasing overload of rural communities, which have typically small administrative structures, by project firms offering to develop GMPS in their community. Faced with dozens of offers for different areas, they are often times overwhelmed (ibid.). Regional planning by higher level could provide a more holistic picture to offer guidance and alleviate some burden from municipalities (ibid.).

Ground-mounted PV systems are generally allowed on areas designated in the local land use plan. However, GMPS on arable land are generally excluded from receiving remuneration under the Renewable Energy Act in order to avoid land competition between the two existential fields of agricultural and energy production (EEG, 2020). Only up to 10 solar PV projects annually can be built on arable land in specifically defined disadvantaged regions under the subsidy scheme. This reduces the available area for building solar PV installations and causes distortion of competition in cross-border tenders for solar PV. Reacting to this bottleneck, German Federal States make use of a permission to deviate from the Federal Rule at State Level (*Länderöffnungsklausel*) allowing them to increase the volume of solar installations built on arable land in specifically defined disadvantaged regions (BNA, 2020).

An industry representative underlines that the publicly feared competition between agriculture and GMPS is not to be worried about looking at absolute numbers. Already 2% of Germany's agricultural land would suffice to meet the country's electricity demands; a claim that the industry is far from making (Brühl, 2021).

A public servant adds the growing dimension of competing interests between landscape protection and large GMPS that regains relevance as less visible areas become more and more scarce with ongoing deployment (Public Servant, 2021). This dynamic centres around the question of whether the general public prefers most cost-effective, large plants or less economically-effective, decentral structures on rooftops and small ground-mounted systems (ibid.).

Rooftop PV systems

No barriers detected.

Identified good practice

Onshore wind

- Onshore wind energy plants are generally eligible for construction on undeveloped land (§35 BauGB, 2020). Only regional and municipal land use planning can steer site eligibility by defining priority and suitability areas and thereby implicitly advise against projects on other sites (BMWi, 2020a). The prioritising instrument (*Konzentrationszonenplanung*) facilitates successful site selection and public acceptance, a legal expert and an environmental NGO representative affirm (Endell, 2020; Wessel, 2020). However, this instrument has also been used by some municipalities to practically block development of wind energy in their community by defining particularly small areas as exclusive sites, which, in turn, has led to lawsuits initiated by project developers that feel systematically discriminated (Stiftung Klimaneutralität, 2021). Even though some project planners perceive the instrument as a limiting factor, its absence would lead to much higher public opposition and subsequent objections, she is convinced (Endell, 2020).

  In this regard, room for improvement remains for more holistic planning beyond the municipal level (*Gemeinde*) so that cumulative effects of several power plants could be considered *ex ante*. For this, regional planning would be more effective on a higher administrative level and an improved knowledge exchange between administrative levels that often falls short due to lacking manpower (Wessel, 2020). Another benefit of more coordination would be that project planners have better options to successfully identify and obtain an alternative location. Currently, the dominating practice is that project planners modify their wind parks to comply with requirements instead of considering equally suitable but less environmentally-impacting sites (Wessel, 2020).

- Most German federal states passed ordinances on spatial planning requirements for onshore wind development to steer or assist regional or municipal planning efforts. Niedersachsen, for example, elaborated its *Windenergieerlass* in 2016, which for example prescribes its municipal authorities the application of a minimum distance to residential areas and that environmental concerns always require individual examination on a case by case basis (Ministerium für Umwelt, Energie und Klimaschutz, 2016). This provides a more consistent legal framework for project planners and releases pressure on local authorities by providing guidance on technical matters.

- Another measure taken to increase the public acceptance for wind parks was taken in the 2020 amendment to the Renewable Energy Act (EEG, 2020), allowing plant operators to pay municipalities up to EUR 25,000 annually for each wind turbine in their community (Stiftung Klimaneutralität, 2021).

2.1.1.2. Administrative authorisation

Process flow

Onshore wind

The authorisation process follows the regulations of the Federal Immission Protection Act (BImSchG, 2020) with a concentration effect of a competent authority's ruling. This one-stop-shop design hence includes all public legal aspects from environmental aspects to building codes and turbine type. German State law design defines one competent authority on the State, district, or municipal level. In Lower Saxony, this may be one of the 42 districts (*Landkreise* or *Kreisfreie Städte)* (Land Niedersachsen, 2020).

The administrative authorisation consists of several steps:

The project developer submits a first authorisation application to the competent authority (in Lower Saxony, an office on the district level), which is obliged to respond within one month (9. BImSchV, 2020).

A scoping conference (*Behördenkonferenz*) follows. Here, an initial project presentation takes place to identify topics of relevance and the scope of required expert reports (9. BImSchV, 2020). This initial process requires project planners to organise first expert reports on environmental impact and detailed information of the plant such as the spatial arrangement of the turbines in a wind park, their technical details as well as information on infrastructure and grid connection. At the scoping conference, depending on the size of the plant and its specific context, the competent authority determines whether a formal procedure (§10 BImSchG 2020) or a simplified procedure (§19 BImSchG 2020) applies.

The simplified procedure (§10 BImSchG 2020)

The competent authority may decide for a simplified procedure if considering the project's environmental impact, risks to health and life as well as the plant's disadvantages to the public and neighbours to be of minor significance (§19 BImSchG 2020). According to an expert, the number of cases of onshore wind power projects that fall under a simplified proceeding is decreasing, due to the constantly increasing technical dimensions of wind turbines (Endell, 2020).

The formal procedure (§10 BImSchG 2020):

The formal procedure, in contrast, mandates the inclusion of the public and eventually leads to public hearings on the project. Moreover, it obliges the project to obtain an environmental impact assessment (EIA). Requirements include an expert report on immission protection for turbines higher than 50 m and a turbine approval on the basis of type-certification by the German Institute for Construction Technology (DIBt) to assure the constructions' technical stability over their lifetime (*Typenprüfung*), which is regulated by State Law (e.g. (art. 62a BayBO, 2020). Moreover, a screening evaluates the necessity of an EIA, which may be required in highly sensitive areas and are mandatory for projects with more than 20 wind turbines (§5 & Attachment 1 UVPG, 2010).

The submission of all demanded experts' reports on identified topics as well as the results of the EIA constitutes the subsequent steps for the applicant party and opens the official part of the application process. Duration of this application preparation process diverge from less than a year up to more than three years (FA WindFA Wind, 2015).

1. As part of a formal procedure, the competent authority conducts a public announcement of the application (*öffentliche Bekanntmachung)* in the official bulletin (*amtliches Mitteilungsblatt*), in local newspapers and optionally on the internet (§8 9. BImSchV, 2020).
2. Following the public announcement, application documents are publicly available for consultation at the municipal authority (*Öffentliche Auslegung)*. Every natural and legal person that feels concerned about the project may submit written objections (*Einwendungen)* within 14 days (one month for projects obliged to an EIA) after the end of the consultation period (§12 9. BImSchV, 2020).
3. Starting with the competent authority contacting them, other authorities have one month to submit statements concerning their areas of competence. The lack of a statement until the end of the deadline presupposes a waiver of the authority to participate in the process (§11 9. BImSchV, 2020).
4. A discussion of reported results together with other involved parties such as public entities or stakeholders (*Erörterungstermin*) may follow if the parties have timely expressed their objections and if these have been deemed relevant by the competent authority (§14 9. BImSchV, 2020). Afterwards, the competent authority evaluates the application together with all risen concerns.
5. The eventual approval by the competent authority issuing an authorisation reply (*Genehmigungsbescheid)* concludes the procedure. The applicant party may object the authority's decision. Should the objection also be denied by the authority, the applicant may address an administrative court to contest the authority's decision.

In addition to the Federal Immission Protection Law (BImSchG, 2020), federal state regulation (such as minimum distance requirements affecting the site selection process), and the Building Code (BauGB, 2020), are central legal references to be adhered to in the administrative authorisation process.

Repowering plans of existing wind parks must follow the same procedure as new projects but legislative amendments are currently being discussed (Endell, 2020). Against the current legal framework in BImSchG prescribing a new administrative procedure for any new plant, from an environmental perspective, certain procedural simplifications could be made (if, for example, turbines were simply replaced by more efficient models), while other cases of environmentally-doubtful wind parks would require a new EIA, an environmental expert estimates (Wessel, 2020). Therefore, universal reference standards would be desirable.

A public servant, in turn, emphasises that simplified authorisation processes by default would not be recommendable as repowering plans highly diverge in their nature (Public Servant, 2021). While some may just replace existing turbines with more efficient models of similar specifications, others might significantly increase the size of turbines and alter the locational arrangement of the wind park. With regard to environmental concerns, the expert further outlines, one would also have to evaluate individual cases as larger turbines sometimes but not always mean a reduction (sic) of environmental pressure because their distance to the ground is larger than of smaller models (Public Servant, 2021).

Ground-mounted PV systems (GMPS)

For ground-mounted PV systems, the most time-consuming part of the administrative authorisation constitutes achieving the amendment in the municipality's land use plan (Brühl, 2021; see section 2.1.1.1.). Unlike onshore wind projects, a GMPS does not require an immission protection authorisation but only a building permit (BauGB, 2020). German State law (*Landesbauordnung*) prescribes the respective requirements and

defines the competent authority, which in some states has a bundling competence (e.g. Brandenburg) (Brühl, 2021). In Bavaria, a GMPS do not require a building permit once the project has been acknowledged in the municipality's local development plan (*Bauleitplan*) (art. 58 BayBO, 2020; Energie-Atlas Bayern, n.d.).

Beyond that, additional authorisations such as water body protection are seldomly required for the project realisation (Brühl, 2021). In general, GMPS rarely faces challenges in the administrative authorisation process for various beneficial reasons. GMPS generally carry less conflict potential with environmental interests than onshore wind power plants because ecological effects on the local ecosystems are more easily evaluable and already better understood than, e.g., wind turbines' effects on bat populations, issues with big remaining knowledge deficits, an environmental expert explains (Wessel, 2020).

Likewise, the conflict potential with neighbouring parties is much lower because objections are only legit if the plant negatively affects their property (Brühl, 2021). Moreover, the public acceptance has been increasing over the past decade in the light of risen awareness to climate change adaptation (ibid.).

Rooftop PV

The administrative authorisation process for rooftop PV systems is partially regulated by federal law (BauGB) and regional law (*Landesbauordnungen*). Depending on the region, the responsible competent authorities can be different entities at municipal or regional level as defined in the regional building codes (in case of Bavaria art. 53 BayBO).
The general rule is that an installation of a rooftop PV system does not get a permission through a formal process (*Verfahrensfrei* in case of Bavaria art. 57 BayBO). In other regions, such as Berlin, the exemption does not apply to PV installations on high-rise buildings (art. 61 BauO Bln). The consequence of the exemption is that the installation of the rooftop PV still must adhere to the rules of the building regulation, such as fire protection regulation, but the competent authority does not verify the project in a formal process. It is nevertheless common practice to contact the responsible building authority to exchange and obtain information (PV Grid Consortium, 2016).

A former municipal counsel pointed at municipal building statues (so-called *Örtliche Bauvorschriften* or *Bausatzungen*) that can impose restrictions to the installation of rooftop PV (Schiermeyer, 2021): In certain municipalities (usually such with a particular building ensemble worthy of protection) regional building laws can allow municipalities to enact such building statutes to regulate specific local issues, for example the design and composition of roofs for aesthetic reasons (for Bavaria: art. 81 BayBO). Such building statutes can prohibit the installation of PV systems altogether or partially (for example PV systems which are visible from a public street).

Rooftop PV systems that are installed on buildings, which are listed as historic monuments, require a special permit from the competent authority. In Berlin, for example, buildings with 15% of the overall PV potential are subject to such historic monument regulations (HTW PV2City, 2020).

Deadlines

- The competent authority needs to respond to the initial application within one month and may extend this deadline by two weeks under special circumstances (§20-2 BImSchG, 2020).
- After the confirmed completion of submitting required documents, authorities need to approve the application within three months in case of a simplified procedure and within

seven months in case of a formal procedure if no delays caused by third parties occur. Eventual delays need to be explained to the applicant and allow for a prolongation of three months (§7 9. BImSchV, 2020; §10 BImSchG, 2020).

- Other authorities concerned have one month to submit statements on the application concerning their areas of competence. The lack of a statement until the end of the deadline presupposes a waiver of the authority to participate in the process (§11 9. BImSchV, 2020). However, other public authorities not always respect deadlines. As no sanctioning mechanism exists but the technical expertise cannot be substituted elsewhere, competent authorities have no means of accelerating this process (Interviewee, 2020).
- Industry advocates demand the automatic approval of objections by third parties in case of non-fulfilment of deadlines. This is legally foreseen (§11 BImSchG, 2020) but not always practised, they criticise (BWE, 2019).

Detected barriers

Understaffed authorities. Over time, administrative processes have become more time intensive, currently amounting to 24 months for onshore wind project development and describing it as the major barrier, various stakeholders affirm (Endell, 2020; Onshore Wind Energy Firm, 2021; Public Servant, 2021). Some outline a tendency of competent authorities to delay the beginning of the actual authorisation process by repeatedly asking for additional reports and more documents, causing an increasing prolongation of the application preparation process.

This may have various reasons. First, it is perceived an expectable consequence of an advancing development. With growing expansion, less conflictive sites are increasingly used and additional development needs to seek potentially more conflictive sites where more and more co-factors (aviation, nature conservation) need to be considered by authorities (Honnen, 2020; Public Servant, 2021).

As outlined below, competent authorities possess no means of sanctioning eventually delayed responses from expert authorities but in practice can neither ignore their delayed statements such as for example concerns on air space safety (Interviewee, 2020; Public Servant, 2021). Often times, these expert authorities themselves significantly lack resources to assess incoming cases in parallel to their primary responsibility (Public Servant, 2021).

Moreover, the competent authority must consider all factual changes until the very end of the authorisation process but particularly with regard to species protection the situation changes permanently throughout the year (Interviewee, 2020). One remedy might be to legally set a deadline within an administrative authorisation process after which no more factual changes need to be considered by the authority (ibid.). However, the practical implication of such a setting remains doubtable with regard to aspects such as safety requirements.

Another motive might be intrinsic to competent authorities as a shift of worktime from authorisation processes to longer application preparation processes assists the achievement of statistically smooth and timely authorisations by ‘outsourcing them’ to the previous step, some stakeholders speculate. This view is relativised by a public servant with the argument that there are no negative effects of delayed processes for competent authorities (Public Servant, 2021). Instead, her view is that they often times lack expertise on this complex legal and technical matter (ibid.; see paragraph below).

According to an investigation by FA Wind, competent authorities claimed that existing regional development plans and spatial development plans for an area would accelerate an authorisation process. The organisation's study on ongoing authorisation processes, however, did not confirm this claim (FA WindFA Wind, 2015).

Most actors affirm the need of more administrative staff at competent authorities (BWE 2019; FA Wind and BWE, 2019; Honnen, 2020; Kemfert, 2020; Public Servant, 2021). Others specify it depends on the circumstances as competent authorities are situated on different administrative levels in different States (Endell, 2020). A tendency of professionalisation is notable in federal states where the competent authority is at a higher administrative level (e.g. *Schleswig-Holstein*) because a higher frequency of similar application results in more routine and a building-up of competences (Endell, 2020; Public Servant, 2021). With regard to obstacles from specialised authorities, air security restrictions by civil and military authorities constitute one major obstacle for onshore wind projects outlined in more detail in section 2.1.2.1. (Endell, 2020; Public Servant, 2021).

Rooftop PV installers also suffer from understaffed authorities, for example when they deal with installations on historic monuments or on high-rise buildings (HTW PV2City, 2020). However, since rooftop-installations require less or no exchange with public authority, rooftop PV installers are less badly affected than installers in other segments.

Challenges of public consultation. Experts recommend more and earlier participatory involvement, which might help avoid initial concerns become lengthy lawsuits (Endell, 2020; Wessel, 2020). In general, more training in participatory methods and climate communication for staff of competent authorities would be desirable to avoid lengthy procedures arising from weak stakeholder involvement (Endell, 2020; Wessel, 2020). Next to forward-looking land use planning, an environmental expert emphasises, conflicts are most effectively prevented by including stakeholders such as residents in the process as early as possible (Wessel, 2020).

These perspectives underline that understanding public participation as a source of delay for projects is a misconception. Instead, delays are the effect of insufficient participation in earlier planning phases and, at times, administrative mistakes, which then leave lawsuits as the *ultima ratio* remaining (Interviewee, 2020).

Civil participation should not only be limited to opinion-voicing but encompass economic inclusion of residents. Studies show that citizens' projects are an effective mean to increase public acceptance by sharing the profit with local stakeholders, an expert affirms (Wessel, 2020; e.g. Agora Energiewende, 2020; FA WindFA Wind, 2020a). The phasing out of previously existing policies for energy communities' (*Bürgerenergiegesellschaften*) preferential treatment in public auctions as a reaction to their previous overrepresentation undermines this opportunity. Until May 2020, for example, energy communities had been allowed to split their financial collaterals into favourable parts (Bundesnetzagentur, 2020). Notably, the share of energy communities among successful bidders has sunk over the past auctions (Bundesnetzagentur, 2021a). The privilege of energy communities to receive the highest awarded price instead of their own bid price, however, remains (§36g EEG, 2020).

An interviewed environmental expert emphasises that on a content level, consultation processes generally take place in a qualitatively high, professional manner. However, some procedural aspects pose difficulties or tend to - presumably unwillingly - systematically exclude certain stakeholders (Wessel, 2020). Deadlines for official statements (*Stellungnahmefristen*) are so tight that they are difficult to be met,

especially for parties whose staff works on a voluntary basis and yet demands for process acceleration succeed. Similarly, citizen participation often times faces practical limitations, for example if the public display of planning documents at public authorities is only possible during regular working hours or, similarly, if public hearings take place at times where citizens typically have to be at work.

Digitisation of documents displayed provides some leverage to these obstacles. However, pursued as a sole mean, it excludes other parts of society who are digitally less literate and is often impractical for reviewing planning processes as plans' size and format typically impede a useful handling on a standard computer screen. Beyond the progress that has been made already, the expert would welcome additional efforts taken by public authorities as well as project planners to help facilitate more inclusive participation processes in practical terms (Wessel, 2020).

Private initiatives against wind power projects are professionalising, enjoying increasing political backing and hence becoming more effective in inhibiting domestic wind power deployment, industry advocates say. Motivational factors are the desire for landscape conservation, fear of losing touristic attractivity and nature conservation (RNP, 2020). In 2019, a nation-wide survey found more than 300 wind power plants of more than 1,000 MW capacity to be sued (FA Wind and BWE, 2019). Regarding species protection, 60% of onshore wind energy projects in the survey on development barriers stated that environmental NGOs would sue their project of which half of the lawsuits is led by one single NGO (FA Wind and BWE, 2019).

One aspect of rising lawsuits to be critically considered is the underlying motivation, a representative of an environmental NGO replies (Wessel, 2020): Increasingly, environmental objections are used as an excuse by other interest groups such as residents with a NIMBY mentality (not-in-my-backyard), at times supported by local populist parties. The NGO therefore recommends to critically reflect statistics of apparently environmentally-motivated lawsuits in more detail. In general, the environmental NGO regards lawsuits as an important part of a rights-based administrative procedure and highlights that projects adhering to legal requirements and advisable stakeholder inclusion have no reason to be concerned about decisions at court (Wessel, 2020). This viewpoint therefore suggests seeking more anticipatory solutions that regard lawsuits as consequences of preceding deficits. From this perspective, wanting to reduce the number of lawsuits appears more like an end-of-the-pipe approach than a way of increasing long-term public support for wind energy development.

Environmental protection. Industry representatives criticise that species protection according to the Federal Nature Conservation Law (BNatSchG, 2020) constitutes an overly proportional barrier: Studies found wind parks to be only a minor factor of influence to bird populations compared to other threats (BWE, 2019). Indeed, an NGO representative emphasises that despite their effects on local populations, wind parks should not be misunderstood as the only relevant factors of environmental pressures. Assessments of cumulative pressures from several causes are difficult to assess and cannot be automatically generalised (Wessel, 2020).

Another legal expert confirms the perception that the most significant barriers are species protection due to legal uncertainty about the 'significance' of animal death rates (Endell, 2020) and a public servant agrees on the perception that the balancing of wind energy deployment and species protection are among the most challenging obstacles in Germany (Public Servant, 2021). Likewise, for GMPS an industry representative highlighted that environmental authorities typically cause the longest delays in the authorisation procedure because their requested assessments are by their nature much

more time-consuming than, e.g., an export report requested from the water protection agency (Brühl, 2021).

In 2015, around 20% of 106 onshore wind park projects analysed in a German market survey were subject of an EIA (FA WindFA Wind, 2015) but over the past years voluntary EIAs have become a much more frequent practice in response to rising environmental concerns by the public and NGOs (Endell, 2020). The average length of an EIA was almost two years, hence constitutes a relevant factor of longer authorisation processes (FA WindFA Wind, 2015). The current regulation on the application of the Federal Immission Protection Act requires to first complete the EIA before the application process may be continued (§24b 9. BImSchV, 2020).

Beyond the difficulty of finding the right balance of effective species protection and too restrictive regulations, one public servant points toward EU law, explaining that current regulation demands strict protection within individual cases, leaving little room for more compensatory approaches such as defining certain areas as strictly protected and others as priority areas for wind energy (Public Servant, 2021). Some German federal states nonetheless pursue this strategy, interpreting existing legislation to permit such steps. This, the expert tells, allows project developers to avoid certain areas in the first place and provides them with more planning certainty, which, in turn, reduces the risk of complications and delays in the authorisation process (Public Servant, 2021). Nonetheless, the interviewee affirms, the need to thoroughly assess environmental impact analyses for the specific project remain (ibid.). Simplifying evaluation processes for species protection in priority areas is a legally challenging step, that demands more species monitoring data on each project site as well as more standardised guidelines to direct such processes (Public Servant, 2021).

One promising approach might be to alleviate project developers from some burden by introducing a public data management on nature conservation: Efficiency increases of costs and planning time could be realised if already existing data on species monitoring (e.g., from EIAs of the nearby highway construction) would be managed in a central database and made accessible to project planners (Wessel, 2020). The environmental expert is convinced that existing data coverage is much higher than the information publicly available, causing double work (ibid.). Inclusion of existing expertise of the State Ornithological Institutes (*Staatliche Vogelschutzwarten*) constitutes an initial low-hanging fruit (Wessel, 2020).

A solar industry representative confirms the perception of double work as well as suggestion of bundling environmental assessments into public hands. He adds that the costs for the project developer should not rise through such a measure (Brühl, 2021). This would furthermore neutralise the natural scepticism towards industry for paying for their own environmental assessments (ibid.). Another advantage would be that the centrally collected information could be a public good for everybody, providing currently inaccessible information that facilitates forward-looking planning before entering administrative processes (ibid.).

A public servant cautions that the development of a public monitoring database consisting of publicly generated reports, would be a time-intensive endeavour of several years, which would not directly ease the current need to speed up the deployment of wind energy (Public Servant, 2021). Drawing from existing reports that are under the possession of private firms would be a delicate step demanding an explicit legal basis and potentially resources for financial compensation (ibid.). Consequently, centralised species monitoring under standardised guidelines after federal law appears to be a complex, yet,

in the medium-term rewarding option to ease individual projects' time pressure resulting from lengthy species monitoring analyses.

Uncertainties about the authorisation procedure's outcome. Existing uncertainties about administrative authorisation processes (e.g., arising from environmental concerns or opposing residents) constitute financial risks that raise credit costs and brake deployment of renewable energy sources. One interviewed expert proposes the temporary introduction of public Hermes credit guarantees to accelerate the domestic energy transition (Wessel, 2020). Public guarantees that are practise for German companies developing renewable energy projects in foreign markets, could leverage this effect in order to support the energy transition as a temporary political objective (Wessel, 2020).

Identified good practice

- No universal standard set of documents needs to be prepared by the applicant. Within the context of general legal principles such as the principle of equality, it is in the competent authority's responsibility to acknowledge the completeness of an application - it enjoys discretionary powers on defining the required documents, reflecting the variety of circumstances project applications may face. Furthermore, an incomplete application may not be denied by the competent authority but only leads to a demand for completion of all documents required for the evaluation (FA WindFA Wind, 2020b). Competent authorities are obliged to also assess incomplete applications to the extent possible while having requested additional documents. If eligible, authorities are also required to issue partial permits to the extent that the incomplete application documents suffice to fulfil the legal requirements (9. BImSchV, 2020).
- A project enjoys legal entitlement to authorisation as far as the project fulfills all requirements and if no other public-legal interests stand against the project (§6 BImSchG, 2020).
- Since 2007, the Federal Ministry for Environment runs a clearing authority for the resolution of conflicts concerning the deployment of renewable energy sources in the context of the renewable energy sources act (EEG)[1]. Its service is free of charge and it offers information on ongoing and past disputes (RNP, 2020).
- In 2010, the State of Lower Saxony introduced an electronic authorisation application form for immission protection applications (ELiA), which today is used by eight German federal states and offers an encrypted submission of application documents (Land Niedersachsen, n.d.).

Ground-mounted PV systems (GMPS)

- From an environmental point of view, GMPS should be avoided on arable lands where they compete with food production. Yet, innovative construction approaches appear promising attempts to enable dual-use in the future, one environmental representative assumes (Wessel, 2020). A solar industry practitioner, in turn, is rather sceptical about dual-use concepts as – to date - they fail to provide affordable energy (Brühl, 2021). Even though they may be preferable from a holistic perspective by even positively affecting agricultural yield of some cultures and less water consumption, the higher construction costs do not make it competitive in the current price situation (ibid.). Research therefore proposes the adaptation of existing agricultural and photovoltaic support schemes to compensate the costs and harvest the societal benefits of dual-use concepts (e.g., Rösch, 2016).

[11] https://www.clearingstelle-eeg-kwkg.de/

2.1.1.3. Grid connection permit

Process flow

The Federal energy economics law (EnWG, 2020) requires transmission grid operators to provide all energy production and energy storage providers with grid access under adequate, non-discriminative and transparent conditions. This obliges the grid operator to expand their grid capacity should the system capacity be insufficient to integrate the plants' energy production. In addition, projects exceeding a capacity of 30 kWp require a feed-in confirmation by the grid operator (*Einspeisezusage*) alongside the grid connection permit (EnWG, 2020). For power plants of more than 100 MW nominal capacity, grid access is regulated by the Grid Access Ordinance (KraftNAV, 2020).

EEG (§8 2020) obliges grid operators to grant renewable energy sources prioritised grid access. Thanks to this obligation, grid access is generally not an obstacle to German renewable energy projects (Endell, 2020).

In practice, grid operators typically require the project to already possess an administrative approval to avoid unnecessary paperwork (Endell, 2020). A certification of the energy plant by an independent, accredited expert (*Anlagenzertifizierung)* forms the technical foundation for the grid connection process. Beyond that, producers wishing to feed-in electricity and grid operators must provide each other with the documents required to establish the connection point (PV Grid Consortium, 2016). Following a grid connection application, the grid operator conducts a grid compatibility test. To determine the economically best grid access point, the EEG (2020) obliges grid operators to minimise the accession costs of grid operator and plant operator.

On average, onshore wind parks take 1 to 1.5 years from administrative authorisation until operation, which, however, also includes construction work and other steps beyond grid connection (FA WindFA Wind, 2015). In case a grid expansion is necessary to enable the grid connection, it take about two years until the plant is connected to the grid (Brühl, 2021).

Deadlines

The plant operator has the legal right to receive information on the grid access point within eight weeks from the application and may chose a different access point, bearing eventual additional costs (§8 EEG 2020). However, no sanctioning mechanism exists (BWE, 2021).

Detected barriers

Lacking competition between grid Operators. Overall, industry representatives criticise the current grid connection system to be ineffective due to a lack of competition as it is under the responsibility of one sole grid operator to realise a project's grid access (Erneuerbare Energien - Website, 2019). In addition, a lack of transparency with regard to the data basis used to determine the 'best' grid access point is lamented (ibid.).

Information asymmetry. With regard to the determination of the 'best' grid access point, a solar power representative criticises the information gradient between the grid operator and the project developer. While the former has access to their grid information systems, the latter depends on the selected information provided by their negotiation partner or on additionally paid grid capacity studies. In particular, the representative laments that the grid operator does not have to share additional information concerning

alternative grid access points (Brühl, 2021). Providing this information would enable project developers to plan more dynamically and save time by re-evaluating technicalities themself: Often times the technological progress of GMPS overtakes the duration of project realisation. The technological progress allows an increased capacity of a projected plant but requires changes to its development plan. Project developers could adapt their grid connection application to these changes. Currently, however, they have to pose one specific application for one project and with very concrete production capacities (Brühl, 2021), causing the need of restarting with an entirely new application in case of minor project adaptations such as more efficient solar modules or a spatial re-arrangement of the modules.

More transparency of information on grid connection points would enable them to re-evaluate the significance of project adaptations, consider alternative connection points themselves and relieve grid operators from double work, the expert is convinced (Brühl, 2021). At the moment, his company proactively commissions third-party grid analyses throughout the project development to avoid repeated grid connection applications.

Grid capacity constraints. Grid capacity constraints led to the establishment of a grid expansion area (*Netzausbaugebiet*) in northern German federal states (northern part of *Lower Saxony, Bremen, Schleswig-Holstein, Hamburg,* and *Mecklenburg-Vorpommern*) to achieve a grid development that can bear the capacities of new renewable energy projects. To this aim, the amount of authorised onshore wind energy projects has been limited for the years of 2017 to 2020 in these States (§§10 - 13 and §36c EEG, 2020).

The slow network expansion delays the development of possible wind power projects in northern Germany and further worries exist with regard to a successful integration of additional offshore capacities, which are intended to develop strongly until 2030 (see section 2.1.2.3.). The lengthy grid expansion is due to several elements: The complex and interlinked responsibilities between the central government and federal states, the privately-owned transmission system operators that do not have a strong incentive to expand the grid needed to integrate the increasing share of renewable energy sources and the opposition of local communities to grid infrastructure. Moreover, the decision to install underground cables for power transmission from North to South of Germany has caused further delays in grid developments due to the higher technical challenges and longer time needed for placing underground cables compared to standard overhead powerlines.

The Grid Expansion Acceleration Act (*Netzausbaubeschleunigungsgesetz*) last amended in 2019 is expected to accelerate the grid expansion through simplification and acceleration of approval procedures for new construction, reinforcement and optimisation of power lines (NABEG, 2019).

According to an energy consultant, this challenge also occasionally affects PV plants that are connected to the mid-voltage and low-voltage grid (Meyer, 2021).

Additional costs. Renewable energy plants which benefit from the public support scheme and which are obliged to directly market the produced electricity are required to install remote control systems. Such systems should enable electricity traders to control and if necessary, curtail the electricity production from renewable energy plants. This provision poses a barrier for smaller installations due to the high costs of installing the remote-control systems. Another problem is that this provision also applies to existing renewable energy installations, which retroactively decreases their economic feasibility (RNP, 2020).

Environmental impact of grid connections? A public servant states that grid connection is generally not an obstacle to nature conservation as the cables are installed underground (Public Servant, 2021). Conversely, an environmental expert expects grid connections with rising impacts on soil and ground as well as further grid development to increasingly become a factor to be considered more strongly from an environmental protection perspective (Wessel, 2020).

A remedy proposed by a solar industry representative to decrease this pressure is a shift of focus from developing large transmission networks from Germany's north to south towards strengthening decentralised distribution grids delivering electricity to local consumption entities directly (Brühl, 2021). Beyond lower infrastructure costs, other advantages could include increased resilience and a potential boost to local economies.

Related to this is another proposition: Were local uses of renewable energy more widely exempted from the EEG surcharge, municipalities could use the provision of affordable green energy as an attractor for industries (Brühl, 2021). Currently, however, only direct on-site production of renewable energy is exempted (§60 EEG 2020).

Not always simplified processes for small installations. Most grid operators have set up simplified connection procedures for smaller renewable energy systems, such as rooftop PV systems (usually below 30 kWp). However, according to a PV expert, there are still grid operators that require installers of all sizes to go through the regular grid connection process, which puts an inappropriate burden on installers of small systems (Marwede, 2021).

Identified good practice

- The 'principle of priority' guarantees renewable energy sources preferential treatment for grid connection over other energy plants (§8 EEG 2020).

2.1.1.4. Corporate legal fiscal

Process flow

Generally, newly founded companies need to register at the municipal commerce office and automatically receive a tax number (GewO, 2020). This rule does not apply for renewable energy systems which are smaller than or equal to 5 kWp (GewO, 2020). Before starting operation, plant operators need to register their renewable energy plant at the market master data registry (*Marktstammdatenregister*) (§5 MaStRV, 2017). With the registration as a commercial company, the operators of the renewable energy system also have to become members of the local trade chambers and have to pay a membership fee if the turnover of the installation surpasses a certain threshold (§ 3 IHKG, 2020). During the operation of the renewable energy system, the operator is subject to different taxes, such as income tax and sales tax.

Deadlines

No deadlines related to this process step were identified.

Detected barriers

Tax and trading rules deter operators of small rooftop PV systems. The bureaucracy that is connected to running a commercial business is a serious impediment for operators of small rooftop PV systems (HTW PV2City, 2020). Other experts have

pointed out that operators can chose less burdensome options if they forfeit certain tax advantages (Schrag, 2021). Nevertheless, it seems that these issues can deter prospective operators especially of small systems.

Identified good practice

No good practice related to this process was identified.

2.1.1.5. Other

Process flow

Public tenders

The participation in public tenders is mandatory for power plants with a capacity of more than 750 kW to receive a public premium (§22-2 EEG 2020). From an economic perspective, the public tender constitutes a necessary process step for onshore wind projects that are mostly financially dependent on the subsidy to operate economically sustainably (Endell, 2020). An administrative approval of the project is a prerequisite for participation (§36 EEG, 2020; FA Wind and BWE, 2019). These auctions take place several times a year and are conducted by the Federal Network Agency (BNA).

The Federal law for renewable energy envisages special conditions for community energy projects (*Bürgerenergiegesellschaften*) (§36g EEG, 2020). These special rules had been made use of heavily during the auctions rounds in 2017, which led to unintended consequences. Since the beginning of 2018, the preferential rules for community energy projects have been partially suspended, with a widening of the suspension in May 2020. The only remaining privilege allows them to be awarded on the basis of uniform pricing rather than their own bid (see §104 Abs. 8 EEG, 2020). Notably, the share of energy communities among successful bidders has sunk over the past auctions (Bundesnetzagentur, 2021a).

Deadlines

Deadlines are not applicable for this process step.

Detected barriers

Slow legislation. General criticism also exists against the overall effects of the legislative development (EEG) on the deployment of onshore wind energy (Energy Experts, 2021): The dynamics described are perceived less as a consequence of one specific regulation but rather resulting from the overall dynamics arising between the technological progress, more slowly adapting laws, differing practices within Germany's Federal governance system and a loss of trust in profitable wind energy deployment due to legal uncertainties from lawsuits (e.g., environmental conservation or spatial planning amendments), changing legal regulation on the subsidy scheme. Consequently, the opinion exists that these factors of uncertainty particularly inhibit regional initiatives and citizen energy communities but also the supply chain that has longer product cycles than the legislative changes endure (BWO, 2020; Energy Experts, 2021).

As solutions, measures of increased legal certainty in the realm of spatial planning, administrative authorisation processes and concerning the public support scheme are vaguely proposed (ibid.).

Deconstruction. The Federal building code includes a self-obligation of the project holder to demolish the entire construction at the end of its life cycle (§35 BauGB, 2020).

In practice, details of deconstruction issues of wind parks gradually get more relevant, with uncertainties concerning the underground base of the wind turbine and whether legal obligations to form financial security for demolishment can be demanded (Interviewee, 2020). Environmental experts also expect this topic to gain relevance in the upcoming year (Wessel, 2020).

Regarding GMPS, an expert notes that the legal obligation for a financial security is understandable but practically unnecessary as the recycling of materials covers deconstruction costs and usually yields a small profit (Brühl, 2021).

Identified good practice

No good practice related to this process step was identified.

2.2. Offshore wind

2.2.1. Relevant process steps

Offshore wind plants in Germany may only be constructed in designated areas. To date, project developers must gain their usage right for sites alongside with their public support premium in a public auction system tendered by the Federal Network Agency (BNA) (§§46 WindSeeG, 2020). The subsequent administrative authorisation of the wind park and its grid connection is taken by Germany's Federal Maritime and Hydrographic Agency (BSH) in two separate authorisation processes. Overall, the current legal regime for Germany's offshore development constitutes a structurally well-designed framework that responds to challenges of previous systems before 2017, a legal expert affirms (Prall, 2021).

Offshore projects within 12 nautical miles of the German coast (*Küstenmeer*) are not subject to the authorisation procedure of offshore wind parks as stipulated by the *WindSeeGesetz* but follow the rules of onshore wind authorisation processes described in section 2.1.1.

2.2.1.1. Site selection

Process flow

Site selection for offshore wind energy plants in Germany is publicly determined and given out to project developers via auctions. Before the allocation of sites takes place in the auction process, the sites have to be designated by the German Federal Maritime and Hydrographic Agency (BSH). The Federal Law on Offshore Wind Energy Deployment (WindSeeG, 2020) names the agency to be in charge of designating offshore wind energy areas in the German exclusive economic zone (a 200 nautical mile range, excluding 12 nautical miles of coastal water).

The BSH develops the maritime spatial development plan (*Maritime Raumordnung*) with the aim of enabling a better coordination between the different maritime interests (i.e., shipping, offshore wind energy, maritime environmental protection). The plan also defines priority areas for offshore wind development (in 2020 - North Sea: *Nördlich*

Borkum, Östlich Austerngrund und Südlich Amrumbank; Baltic Sea*: Kriegers Flak, Westlich Adlergrund*) (BMWi, 2020b). Consequently, offshore wind energy projects may only be realised on dedicated areas and must follow the detailed specifications of the BSH's spatial development plan.

Since 2019, the agency's site development plan (*Flächenentwicklungsplan* FEP), building on the guiding principles of the maritime spatial development plan, constitutes the technical spatial planning instrument for offshore energy production deployment as well as its grid development (BSH, 2020a). The development of the FEP includes extensive consultation processes, early site adaptability investigations and strategic environmental assessments (BSH, 2020b). The FEP further specifies the temporal roll-out of sites as well as their production capacity.

Project developers may bid for sites in a public auctioning process conducted by the German Federal Network Agency. The first auctions took place in April 2017 and 2018, each with a tendered volume of 1,550 MW (Bundesnetzagentur, 2021b). From 2017 to 2021, a transitioning phase reduced the number of projects by excluding new projects from the auctioning system, approving only projects that had already been under development under a previous authorisation scheme before 2017. The aim of this measure was to reconcile a grid development deficit that had formed as a result of rapidly increasing numbers of offshore projects and to synchronise the development in the future.

The current transitioning phase shall give project developers enough time - in an industry that faces long development cycles - to adjust their planning to the new authorisation design described here. Annual auctions granting sites to new projects take place from 2021 onwards (§17 WindSeeG, 2020). Their tendered volume depends on the sites designated available in the spatial development plan (FEP) (§18 WindSeeG, 2020).

By 2021, the German authorities will to start the new 'central model' of auctioning, which will only award developers in respect to sites designated in the site development plan (FEP) (Bundesnetzagentur, 2021; §16 WindSeeG, 2020).

Deadlines

No deadline related to this process step was identified.

Detected barriers

Constrained site availability. As a consequence of the intermission of authorising new projects between 2017 to 2021 described above, further project planning has been on hold. This causes an economic threat to the entire supply chain industry as the industry is characterised by a very long business cycle where delays in demand have long-reaching consequences, industry representatives criticise (BWO, 2020).

Moreover, designation of new sites occurs too slow, industry representatives believe (WindEurope Workshop, 2020). The BSH is said to have an annual capacity of three site investigations (ibid.). Industry representatives claim, market actors themselves would be able to conduct more investigations, accelerating the deployment of offshore capacities (ibid.). However, regardless of site investigations, a public servant explains that foreseeing suitable areas in the planning process is a major challenge in the light of limited space and strong competing interests (Public Servant, 2021): Nature conservation is a primary restrictor, fishing and shipping as well as military interests demand further restrictions, leaving few unplanned areas available for wind energy.

Grid development as a bottleneck for useable project sites? A report of an environmental NGO questions the 2030 capacity target of 20 GW of offshore wind energy in German waters as overly optimistic (BUND, 2020). The study focusses on the grid connection to the shore as well as conservational aspects and presents various obstacles, arguing that a target of 15 GW by 2030 would be more realistic.

First, the report explains that authorisation and land use evaluation processes on the grid connection in the German State of Lower Saxony, where most of the generated offshore electricity is planned to be directed to, are still ongoing. The NGO emphasises that the German offshore site development plan (FEP) unrightfully presupposes positive assessments in their wind energy deployment plans despite the fact that the context of the UNESCO world nature heritage *Wattenmeer* and coastal landscape conservation interests deserves a thorough weighing of all interests (BUND, 2020).

Furthermore, BUND's report (2020) criticises that offshore production capacity increases in the FEP imply a violation of an existing agreement with the State of Schleswig-Holstein that there will only be one cable installed: A limitation incompatible with further capacity increases.

Moreover, from an environmental conservation point of view, the report criticises the deficit of impact studies for the stronger cables (more cables per line, bigger diameters, higher voltage) foreseen: Both, the long-term impact on the sea ground as well as from the construction process which demands more powerful ships and novel, untested stabilisation methods required to conduct a safe construction process have so far been unconsidered in the BSH's site development plan.

A public servant, however, relativises this concern by explaining that nature conservation and grid development are generally not dealt with as mutually exclusive interests: Hence, environmental concerns might cause adaptations to existing grid development plans but will not be a reason of abandoning them as a whole (Public Servant, 2021).

Beyond these aspects on a planning level, the report further criticises a lack of realism with regard to timely construction (BUND, 2020): Several grid connection projects to the German shore experience a delay or are still in a planning phase. Based on previous experience, it is unlikely that the connection capacities assumed by the FEP to be available by 2030 will all be realised on time, thereby blocking the achievement of the targeted 20GW of capacity.

Overall, the report warns of overly optimistic deployment scenarios, and demands the respectful conduct of all legally-foreseen environmental assessments. Pragmatically, the authors also propose the conduction of supra-regional, international environmental impact assessments in the small Baltic Sea as well as the integration of natural protection areas without any utilisation in the site development plan FEP. These areas should act as a retreat option for maritime species in the light of increasing and intensifying utilisation of most areas (BUND, 2020).

A consulted offshore expert explained her biggest concern about a quick offshore wind energy development regards the capacities of the connection nodes onshore, which integrate the offshore energy into the German electricity grid (Prall, 2021). With the *Wattenmeer* being a highly protected conservation zone, offshore-onshore grid connection in the North Sea needs to be highly concentrated within the remaining coastal area. Similarly, the political decision that there may only be one connection in the German North Sea's northernmost area of *Nordfriesenland*, leads to increased pressures of other sections of the coast. Germany's transmission grids have already been facing

difficulties to keep up with the increasing energy volumes, requiring a temporary deployment stop of onshore wind energy in parts of Northern Germany (see section 2.1.1.3.). With ambitious development goals of offshore energy, the pressure on the German electricity grid keeps increasing (Prall, 2021). A potential leverage might be the development of green hydrogen generation hubs at the coast or even offshore, which could convert part of the generated electricity into a storable energy carrier.

Environmental protection. Beyond the criticism of insufficient consideration of nature conservation in the site development process, the report of an environmental NGO criticises that both, the competent authority (BSH) as well as project developers fail to present strategies on how to counter continuously increasing noise pollution and loss of habitat due to expanding wind parks but also more powerful turbines that block more air space for bird migration and require more intrusive construction of support pillars in the sea bed (BUND, 2020). The authors propose the integration of natural protection areas without any utilisation in the site development plan FEP. These areas should act as a retreat option for maritime species in the light of increasing and intensifying utilisation of most areas (BUND, 2020).

Mediocre authorisation process for coastal offshore projects close to the coast. Offshore projects within 12 nautical miles of the German coast (*Küstenmeer*) are not subject to the authorisation procedure of offshore wind parks as stipulated by the *WindSeeGesetz* but follow the rules of onshore wind authorisation processes described in section 2.1.1. A consulted expert explains that the onshore authorisation process following BImSchG (2020) does not perfectly fit the reality of coastal offshore projects (Prall, 2021). While competent authorities in coastal States give their best to interpret the legislation to the differing circumstances, more recourse on maritime data administrated by the BSH and their experience might be helpful (ibid.). A centralisation of relevant authorisation processes to the BSH as Federal agency alongside the existing practice for offshore wind energy beyond the 12 nautical mile zone, however, would be incompatible with the German constitution (ibid.).

Identified good practice

- An expert explained that thanks to the field analyses (*Flächenvoruntersuchungen*) conducted after the development of the site development plan (FEP) by the BSH, the risk of an authorisation application is considerably lowered: Apart from the wind park's individual technical specifications, more general suitability criteria such as environmental aspects or shipping safety have already been assessed by the competent authority (Prall, 2021).
- Under previous regimes, the German offshore wind deployment had become increasingly constrained by the development of its grid infrastructure, which saw a slower realisation speed than the construction of the actual wind parks. This problem was essentially solved by the current regulatory system, a legal expert outlines (ibid.): The development of the FEP as central reference for the spatial development of German offshore capacities also includes the respective offshore grid development into the planning. Consequently, this will essentially lead to a synchronisation of wind park and grid development as the FEP provides grid operators with a more long-term planning basis, while wind park developers have a shorter, yet sufficiently long realisation period after a successful bid in the auction (ibid.).
- As the competent maritime spatial planning agency, the BSH is entitled to define areas within the German exclusive economic zone in which no installations may be constructed (*Veränderungssperre*) (§52 WindSeeG, 2020). This reservation is intended to save the respective area for future offshore wind plants or offshore grid development.

These measures always must be in accordance with the agency's FEP and may last for a maximum of four years with the option of a three years' prolongation (ibid.).

2.2.1.2. Administrative authorisation

Process flow

Germany's current one-stop-shop design for offshore wind energy offers project developers a single authorisation process at the BSH as the competent authority with bundling competence (§45 & §47 WindSeeG, 2020). The Federal Wind Sea Regulation (§23 WindSeeG, 2020) defines the Federal Network Agency (BNA) to be in charge of awarding sites for offshore wind energy projects in Germany's exclusive economic zone (AWZ) to project developers via public tenders. The Federal Maritime and Hydrographic Agency (BSH), in turn, possesses the mandate to authorise projects that have been granted sites in the auction procedure (§46 WindSeeG, 2020).

Projects need to undergo a planning approval procedure (*Planfeststellungsverfahren*), which involves stakeholder consultations and an environmental impact assessment with a public consultation (§45 and §47 WindSeeG, 2020). Among other requirements, developers need to conduct/ organise (§47 WindSeeG, 2020):

1) a project application at BSH, which informs other public entities and the general public of the intended constructions;
2) an environmental impact assessment according to the German Environmental Compatibility Law (UVPG);
3) an initial project presentation at a scoping conference to identify topics of relevance such as shipping safety and environmental protection;
4) the submission of experts' reports on topics identified relevant in the scoping conference such as the results of the EIA.

Deadlines

There is no deadline for the BSH to complete the authorisation, but the competent authority has to make sure the project developer is not constrained in meeting its deadlines as defined in §59 WindSeeG (2020) concerning its development progress. Mandatory progress milestones among others include the submission of the project development plan to BSH within 12 months after a successful bid, as well as the complete installation of all wind turbines not later than six months after the scheduled project realisation (§59 WindSeeG, 2020). The project realisation deadline is specified by the BSH following the regulations of §17d EnWG (2020) and may be extended by the BNA my no more than 18 months (§59 WindSeeG, 2020).

The BSH as a competent authority enjoys a relatively wide margin of action: Considering expert reports, it may authorise parts of the project development one after the other and also set 'appropriate' progress deadlines in order to foster a timely deployment of offshore capacities (§47 WindSeeG, 2020).

The administrative authorisation for the construction and utilisation of an offshore wind energy plant is valid for 25 years and may be prolonged for another five years if the site development plan does not foresee an alternative use of the area (§48 WindSeeG, 2020).

Detected barriers

High burden of organising very comprehensive expert reports. Various expert reports need to be prepared at a high level of detail for the project application, which was perceived a significant burden in previous studies (RNP, 2020).

Inclusive public consultation processes. Stakeholder participation is practiced during the maritime spatial planning and site development planning processes as well as during the project authorisation process. An interviewed environmental expert emphasised that on a content level, consultation processes generally take place in a qualitatively high, professional manner (Wessel, 2020). A legal expert confirms this impression, stating that generally, there are no complaints that participation methods were insufficient (Prall, 2021).

Regarding environmental protection, the expert is convinced thorough efforts are taken where possible, including, among other measures, least invasive spatial planning, definition of protective zones, noise mitigation during construction works and environmentally adaptive management of operations (Prall, 2021). At the same time, she acknowledges the plausible interest of environmentalists to protect as much maritime space as possible from constructions, which keeps the question of a deployment limit a subject of discussion (ibid.).

Moreover, some procedural aspects pose difficulties or tend to - presumably unwillingly - systematically exclude certain stakeholders (Wessel, 2020): Deadlines for official statements (*Stellungnahmefristen*) are so tight that they are difficult to be met, especially for parties whose staff works on a voluntary basis and yet demands for process acceleration succeed. Similarly, citizen participation often times faces practical limitations, for example, if the public display of planning documents at public authorities is only possible during regular working hours or, similarly, if public hearings take place at times where citizens typically have to be at work.

Digitisation of documents displayed provides some leverage to these obstacles. However, pursued as a sole mean, it excludes other parts of society who are digitally less literate and is often impractical for reviewing planning processes as plans' size and format typically impede a useful handling on a standard computer screen.

Beyond the progress that has been made already, the expert would welcome additional efforts taken by public authorities as well as project planners to help facilitate more inclusive participation processes in practical terms (Wessel, 2020).

Criticism of avoidable sea pollution. An environmental NGO's report condemns the lack of action against significant sea pollution through reactive anodes that protect turbines from erosion (BUND, 2020): Over the lifetime of 25 years, the anode of one wind turbine causes a pollution of ten tons of aluminium, which is said to have accumulated to more than 150,000 tons of additional aluminium pollution in the North and Baltic Sea in the past five years (ibid.). Ongoing scientific investigations of the German Helmholtz foundation currently explore the environmental impact of these anodes in depth (Eschenbach, 2021). BUND demands that these effects be considered in environmental impact reports. Also, existing alternative measures of corrosion protection such as the use of electricity should be evaluated more seriously even if they may be more expensive than aluminium anodes.

Identified good practice

- Germany's current one-stop-shop design for offshore wind energy offers project developers a single authorisation process with the BSH as the competent authority (§45 & §47 WindSeeG, 2020). In addition, this process is preceded by another simplified step as site allocation and public subsidy selection are combined into one single process at the BNA (§20 WindSeeG, 2020).

  Comparing the complexity of these two authorisation steps with the procedures required for German onshore wind parks, suggests that the authorisation design developed for offshore wind energy reflects some measures demanded for a simplification of onshore authorisation processes: On land, the structures of the Federal system have so far resisted a development towards more centralised spatial planning and authorisation processes as demanded by various stakeholders (compare section 2.1.).

- German Federal law prescribes the development of financial securities to guarantee a thorough de-construction at the end of a wind park's utilisation (WindSeeG, 2020). This is to guarantee that the turbine will not constitute a long-term burden to the environment after its operation time.

2.2.1.3. Grid connection permit

Process flow

The BSH is in charge of assigning a grid connection to offshore wind projects in Germany's exclusive economic zone (EEZ) on the basis of the maritime spatial development plan and the site development plan (see section 2.1.2.1.). In addition to the administrative authorisation, the organisation is in charge of granting the grid connection permit for the grid infrastructure of offshore projects (§§44 WindSeeG, 2020).

Since 2019, grid connection is based on the agency's site development plan (*Flächenentwicklungsplan FEP*) (WindSeeG, 2020). Offshore wind projects will be connected to one of the grid connection points foreseen in the site development plan. The BNA demands proof of project progress to keep up the awarded site development right, requiring the project developer to proof a certain realisation progress such as initial sea bed inspections and preliminary agreements on the supply of wind turbine parts (BMWi, 2020c). Connection points are assigned via an auction design (ibid.).

Before 2019, grid connections were outlined in the offshore grid development plan (*O-NEP Offshore Netzentwicklungsplan)* designed by grid operators and commissioned by the Federal Network Agency (BNA) (DIW Berlin, 2019). O-NEP acts as the capacity, temporal and spatial planning reference for projects realised between 2021 and 2025 and was integrated in the BSH's spatial development plan (§7 WindSeeG, 2020).

Deadlines

There is no deadline for the BSH to complete the authorisation, but the competent authority has to make sure the project developer is not constrained in meeting its deadlines as defined in §59 WindSeeG (2020) concerning its development progress.

German transmission grid operators with a grid into which electricity of offshore wind power is to be transmitted (TenneT, 50Hertz, Amprion), are responsible to facilitate a timely offshore grid connection (*Offshore-Anbindungsleitungen*) (§17d EnWG, 2020). The grid operators may not start to develop the offshore grid before the BSH has foreseen it in its site development plan (FEP) according to §12 WindSeeG (2020). At the same time,

the operator is required to guarantee the grid's timely realisation with the same calendar year the BSH has scheduled it (§17d EnWG, 2020). The grid operator must keep the BNA informed about the progress of the grid development, on which it has to coordinate with the wind park project developer of the relevant development site (§17d EnWG, 2020). In this regard, the grid operator is obliged to consider the wind park's realisation deadline according to §59 WindSeeG (2020). 30 months before its arrival, the announced realisation date for the grid connection becomes a binding commitment (ibid.).

Detected barriers

Market dominance in offshore grid development regime. A study investigated existing criticism that the German offshore grid development is an overly expensive endeavour, causing higher costs to project developers and higher electricity prices for consumers (DIW Berlin, 2019). The report explains the price gap to other country's offshore grid development designs with the fact that Germany's offshore grid development is not subject of a market competition but a quasi-monopoly situation with TenneT in the North Sea and 50Hertz in the Baltic Sea (ibid.). In the UK, in comparison, offshore wind park developers themselves are responsible to develop their grid connection to the public onshore electricity grid, leading to lower coordination costs. The analysis considers diverging environmental regulations and financing costs, yet, a price gap of 10 EUR/MWh of produced electricity remains (DIW Berlin, 2019).

Until 2006, it was German practice that offshore wind park developers were responsible of their own grid development, an expert explains (Prall, 2021). However, this mode proved problematic in the light of increasing offshore wind projects because the German coastline offers limited space and, under balancing interests, is inapt of allowing for an uncapped number of independent grid connections. For joint grid connections shared by various project developers, the temporal coordination constituted a significant obstacle (ibid.). Therefore, the German context requires a planning approach to guarantee a coordinated offshore development in space and time, the expert concludes (Prall, 2021).

Identified good practice

No good practice related to this process step was identified.

2.2.1.4. Corporate legal fiscal

Process flow

Generally, newly founded companies need to register at the municipal commerce office and automatically receive a tax number (GewO, 2020). Before starting operation, plant operators need to register their renewable energy plant at the market master data registry (*Marktstammdatenregister*) (§5 MaStRV, 2017). Beyond that, legal fiscal processes only become relevant during operation but not during the project realisation, a legal expert explained (Endell, 2020).

Deadlines

No deadlines related to this process step were identified.

Detected barriers

No barriers related to this process step were identified.

Identified good practice

No good practice related to this process step was identified.

3. Use of IT systems

In 2010, the State of Lower Saxony introduced an electronic authorisation application form for imission protection applications (ELiA), which today is used by eight German federal states and offers an encrypted submission of application documents (Land Niedersachsen, n.d.).

4. Complaint procedure

Authorisation application

Onshore wind and GMPS

The applicant may object the authority's decision on the authorisation application (*Genehmigungsbescheid*) at the authority directly. Should the objection be denied or not responded by the authority within three months, the applicant may address an administrative court (BImSchG, 2020; §75 VwGO, 2020). As a first stage of appeal, there are 51 administrative courts (*Verwaltungsgericht*), followed by one higher stage in each German federal state (*Oberverwaltungsgericht*) and the highest administrative court on the federal level (*Bundesverwaltungsgerich*) (§45 - §50 VwGO, 2020). Decisions concerning wind turbines with a height of more than 50 meter are to be addressed to the respective *Oberverwaltungsgericht* as first stage of appeal (§48-3a VwGO, 2020). Responding to complaints of high increases of lawsuits against wind park projects, an acceleration of the judicial stages of appeal is currently developed by policymakers (Endell, 2020).

In general, procedural decisions of the competent authority are not justiciable - only the final judgement on the project application may be challenged (FA WindFA Wind, 2020b). At the same time, it is German case law practice that ancillary provisions of an expert report on immission protection can be challenged in isolation, without having to question the entire decision.

Grid connection permit

Onshore wind & GMPS

The project developer may independently choose a different access point than the one offered by the grid operator, bearing eventual additional costs (§8 EEG 2020). Alternatively, the project developer may decide to legally contest the grid operator's failure to offer the optimal grid connection access according to German civil law (BWE, 2021). A preceding option to object the grid operator's decision does not exist (ibid.).

Offshore wind

The grid operator must keep the BSH informed about the progress of the grid development, on which it has to coordinate with the wind park project developer of the relevant development site (§17d EnWG, 2020). In this regard, the grid operator is obliged to consider the wind park's realisation deadline according to §59 WindSeeG (2020). In case of delay or grid disruption, §17e of the energy economics law (EnWG, 2020) defines the financial compensation the grid operator is obliged to pay to the wind park developer. Juridically, a respective lawsuit constitutes a private law case between the two companies.

5. Specific features to ease administrative procedure

Table 2 below provides information on the existing specific features to ease administrative procedures in Germany.

Table 2: Specific features to ease administrative procedures

Specific feature	Existing	Short description
Simultaneous procedures	no	
National contact points and one-stop-shops	yes	One-stop-shops for administrative authorisation exist, include building and environmental permits but do not include the grid connection permit.
Application of 2+1 and 1+1 rules	yes	**Onshore wind and GMPS** The administrative authorisation process itself is not the most time-consuming factor of the project realisation. For onshore wind, for example, organising all required expert reports for the authorisation project is described the bottleneck. After the confirmed completion of submitting required documents, authorities need to approve the application within three months in case of a simplified procedure and within seven months in case of a formal procedure if no delays caused by third parties occur. Eventual delays need to be explained to the applicant and allow for a prolongation of three months (§7 9. BImSchV, 2020; §10 BImSchG, 2020). Beyond the authorisation process, lawsuits from third parties opposing the competent authority's project authorisation may be an additional source of delay. **Offshore wind** There is no deadline for the BSH to complete the authorisation, but the competent authority has to make sure the project developer is not constrained in meeting its deadlines as defined in §59 WindSeeG (2020) concerning its development progress (see section 2.1.2.2.).
Simple notification procedure	yes	In case of rooftop PV systems, usually no formal building permission process is required.
Pre-planning	no	
Pre-application consultation	no	
Project acceptance measures	no	No obligatory project acceptance measures exist. Nonetheless, interviewed experts emphasised the importance of early stakeholder inclusion before the official authorisation application as an effective mean to reduce the risk of competing interests leading to lawsuits (Endell, 2020; Wessel, 2020).
Measures to streamline litigation by third parties	yes	Since 2007, the Federal Ministry for Environment runs a clearing authority for the resolution of conflicts concerning the deployment of renewable energy sources in the context of the renewable energy sources act (EEG) (www.clearingstelle-eeg-kwkg.de/). Its service is free of charge and offers information on ongoing and past disputes (RNP, 2020).
Other	no	

6. Indicators to measure the performance of the overall process

Table 3 below provides information on the indicators to measure the performance of the overall administrative and grid connection process in Germany.

Table 3: Performance indicators to assess administrative and grid connection processes

Performance indicator	Description
Average response time by the competent authorities and TSO/DSO for grid connection procedures	EEG 2020 obliges grid operators to respond to grid connection applications within two months.
Process duration	The realisation process for offshore wind energy projects takes around 2.5 – 3 years. The time span included in these numbers starts with the award of the development right for the designated site and terminates with the initial operation of the wind park (WindEurope Workshop, 2020). The time needed by the public agency BSH beforehand to identify suitable sites to be made available to project carriers via a public auction system, is not included here. A more recent study sets the realisation of onshore wind energy projects in Germany to typically take around 76 months (6 ½ years) from initial planning and site pre-assessments to operation (Honnen, 2020). This reflects a significant increase of duration compared to five years ago: According to a FA Wind study from 2015, half of the investigated onshore wind energy projects needed between 35 to 69 months for the complete project realisation (FA WindFA Wind, 2015). On average, preassessment was reported to take 14 months, planning processes 24 months, administrative authorisation 17 months and construction 13 months, with individual project lengths highly diverging (ibid.). An interviewed solar industry representative set average project realisation times at about three years, of which 1 ½ to two years are typically taken up by the administrative authorisation process (including changes in the land use plan) (Brühl, 2021).
Project approval rates	N.A.
Costs of administrative processes	According to a FA Wind study from 2015, half of the investigated onshore wind energy projects faced administrative costs (excluding grid access application) from between EUR 30 to EUR 106 (FA WindFA Wind, 2015). Individual project lengths highly diverge. It is contested whether the grid operator may demand a fee for the connection study. The same goes for providing information on the grid connection costs to be expected. In practice, some grid operators charge fees for the connection study (EUR 1,500). Moreover, the grid operator may demand a conformity and a power plant certificate which costs between EUR 15,000-20,000 (PV Grid Consortium, 2016).
Share of permits that are legally challenged	N.A.
Share of legal challenges that are overruled	N.A.

Stakeholder interests	In the Imission Protection Authorisation Process: In the administrative authorisation procedure other stakeholder's interests are properly taken into consideration in formal procedures (simplified procedures do not include the public but are rare for onshore wind energy projects). It is the competent authority's responsibility to inform the public as well as other public authorities about the project application and to facilitate stakeholder participation. Stakeholders may submit objections to the project and express these at a hearing conference. After a project approval, stakeholders may challenge the decision by court. Regarding offshore wind energy development: Two interviewed experts, one of them an employee at an environmental NGO, emphasised the extensive stakeholder participation processes to be working well (Prall, 2021; Wessel, 2020).

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