PART II

APPROACHES TO STRATEGIC ENVIRONMENTAL ASSESSMENT

2. Multi-project-based strategic environmental assessment: practice in Germany

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INTRODUCTION

Strategic Environmental Assessment (SEA) encompasses numerous methodological approaches (see e.g. Dalal-Clayton and Sadler, 2005; Goodland, 1997). At a basic level, these include approaches connected with different tiers (policies, plans and programmes) and sectors (e.g. transport, energy, waste). Furthermore, SEA is often described with regard to two main types, namely: (1) a project Environmental Impact Assessment (EIA) type, which is an impacts-focused administrative procedure ('EIA-like' category); and (2) a more flexible goals-setting policy-based SEA type ('policy assessment-like' category) (Riehl and Winkler-Kühlken, 1995; Fischer, 2007). In a similar, but somewhat more sophisticated way, Noble and Nwanekezie (2016) distinguished between four types: (1) compliance-based SEA; (2) EIA-like SEA; (3) strategic-futures SEA; and (4) strategic-transition SEA. While compliance-based SEA and EIA-like SEAs are described as being "rooted in the traditional paradigms of EIA and project appraisal" (Noble and Nwanekezie, 2016, p. 4), i.e. falling into the 'EIA-like' category, the strategic-based SEA approaches are "rooted in more recent strategic thinking about the role of environmental assessment beyond the scope of traditional impact assessment" (Noble and Nwanekezie, 2016, p. 5), therefore falling into the 'policy assessment-like' category. Whilst the latter is described in this book in e.g. Chapters 4 (Partidário, 2021) and 24 (Jiliberto, 2021), the former is the subject of this chapter and is also elaborated on in various other chapters (e.g. Chapters 6 and 11 by González and Geneletti, 2021 and Faith-Ell and Fischer, 2021).

For an effective application of SEA, it is of key importance that the two types – EIA-like SEA and policy assessment-like SEA – complement each other. In the absence of either, it is likely that gaps will ensue with regard to the consideration of e.g. particular issues, tasks and alternatives (Fischer, 2006). This is discussed for e.g. transport planning in Chapter 11 (Faith-Ell and Fischer, 2021) and is further elaborated on in Chapter 27 ('Conclusions', Fischer and González, 2021).

In addition to these two main types, other ways in which SEAs differ can be distinguished, in particular with regard to the specific situation of application. This is reflected in e.g. Chapter 5 (Marot et al., 2021), which elaborates on territorial impact assessment (TIA) for European policies and directives as well as in Chapter 6 (González and Geneletti, 2021), which elaborates on geographic information system (GIS)-based SEA.

A multi-project EIA-like assessment approach is common for plans and programmes that consist of potential developments, measures and/or other listed designations (subsequently referred to as 'projects'). Within the multi-project approach, as a first step, potential environmental impacts are usually identified, described and evaluated for each individual project. Secondly, impacts of all potential projects are jointly considered as the overall or cumulative

environmental impact of the plan or programme. Frequently, this is attempted simply by summing up impacts of each project, thus potentially ignoring any indirect or synergistic effects.

Assessment methods for the evaluation of individual projects usually focus on specific locations, i.e. they are spatial. This is reflected in most SEA guidelines in Germany (Balla et al., 2010; Hanusch et al., 2015). Here, for individual development proposals ('*räumlich konkret verortete Planfestlegungen*') included in, for example, regional or local spatial plans, quantitative assessment of potentially affected sites by means of GIS is recommended. Furthermore, worksheets are provided for the documentation of environmental impacts on particular locations (so called 'area letters' (*Gebietsbriefe*); see Fischer et al., 2009). These are based on a brief description of potential impacts and suggestions for how to mitigate them (Figure 2.1). A similar approach has been described for SEA of local land-use plans in Austria (Aschemann, 1999; Fischer, 2007).

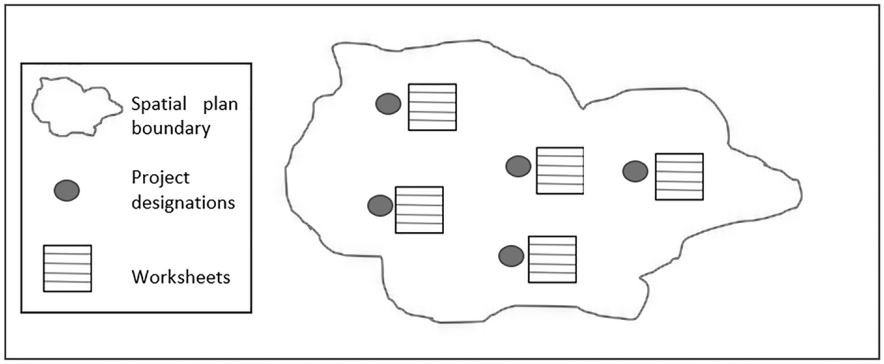

Figure 2.1 Development proposals and worksheet in a land use plan

With regard to the joint consideration of individual impacts of the plan or programme overall (i.e. cumulative impacts), as explained above, impacts of individual projects are frequently either simply summed up or listed in tables (Hübler et al., 1995). More advanced approaches would be based on, for example, analysing the impacts of an entire plan by means of specific criteria and/or specific benchmarks (as described below in the case studies and in Chapter 3 by Hayes and Fischer, 2021).

Some plans/programmes consider projects that would subsequently become subject to EIA. These plans and programmes are found, in particular, in land-use (see Chapter 10 by González, 2021), transport (Fischer, 2006) and energy (IAEA, 2018) sectors. In this context, particular schemes may be ranked according to perceived benefits and costs. These can include environmental parameters, as described in Chapters 10 for land-use (González, 2021), 11 for transport (Faith-Ell and Fischer, 2021) and 12 for energy (Geißler et al., 2021). For these plans, conscious tiering between SEA and EIA should be a priority. Other plans (e.g. masterplans) may also consider projects that will not subsequently be subject to EIA. Here, the SEA is of importance, as it is the only time that the environmental impacts of those projects are considered.

SEAs following EU SEA Directive requirements have been observed to frequently represent an EIA-like SEA approach (Verheem and Dusik, 2011). Procedural stages are the same

as in EIA, namely screening, scoping, drafting of an environmental report and consultation/participation, proposing mitigation measures, making a decision and monitoring/follow-up.[1] Whilst the SEA Directive has been criticised for its EIA-like rationale (see e.g. Nielsson and Dalkmann, 2001), there have also been suggestions that due to its focus on plans and programmes only, the approach taken is suitable, reflecting the perspectives taken by the underlying plans and programmes (Fischer, 2003). In this context, it is argued that the real issue is not a 'wrong' approach to plan and programme assessment, but rather the omission of policies. In this vein, Retief et al. (2008) suggested that it is important to acknowledge that different approaches apply to different contexts, and Noble and Nwanekezie (2016, p. 7) concluded that "there is no one approach to SEA that is best for all decision contexts; rather, each approach to SEA is necessary and valuable – each serves a different function, and each has its relative strengths and limitations." This is also an important message from Chapter 27 ('Conclusions') in this book (Fischer and González, 2021). Keeping this in mind, this chapter will subsequently introduce the EIA-like multi-project approach to SEA, focusing on current practice in Germany.

STRATEGIC ENVIRONMENTAL ASSESSMENT IN GERMANY

The focus of the EU SEA Directive is on plans and programmes that "are required by legislative, regulatory or administrative provisions", and that "are subject to preparation and/or adoption by an authority at national, regional or local level or which are prepared by an authority for adoption, through a legislative procedure by Parliament or Government" (Art. 2 EU SEA Directive). In 1990, the German EIA Act was enacted, transposing the EU EIA Directive (85/337/EWG) into national law. Fifteen years later, in 2005, the EU SEA Directive was transposed through the same Act. Furthermore, SEA was included into the Federal Building Code and the Spatial Planning Act in 2004. In line with the Directive, policies were not included.

According to the EIA Act, SEA screening combines a checklist and case-by-case approaches. Plans and programmes may become subject to SEA, based on the following four considerations (Balla et al., 2010; Geißler et al., 2019; Geißler and Rehhausen, 2014):

1. Compulsory application of SEA due to statutory plans and programmes being listed in Annex 5 of the EIA Act;
2. Compulsory application of SEA due to a required 'Appropriate Assessment'[2] in accordance with the EU Habitats Directive (see also Chapter 15 by Scott, 2021);
3. Conditional application of SEA due to plans and programmes listed in Annex 5 of the EIA Act, setting the framework for projects subject to EIA; and
4. SEA based on case-by-case decisions.

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[1] This does not mean the SEA Directive cannot trigger the application of other types of SEA, e.g. policy-level SEA (see Fischer and Phylip-Jones, 2007) or objectives-led approaches (see Chapter 3 by Hayes and Fischer, 2021). This issue is strengthened by the current European case law in the Case C-24/19 of 25 June 2020: the European Court of Justice ruled that the SEA Directive does not only cover mandatory plans and programmes. Legal acts with a political or indicative objective could also be plans or programmes, otherwise there would be a risk that the environmental assessment obligation could be circumvented by not making plans and programmes compulsory. It is also irrelevant for the classification that a legal act has a certain level of abstraction.

[2] Impact assessments related to sites of the NATURA 2000 network.

In addition to the Federal level, some *Länder* (states) have additional state EIA Acts in place that list additional plans and programmes for which SEA is required (Balla, 2009; Geißler et al., 2019). For instance, landscape plans (that are statutory environmental development plans, see Hanusch and Fischer, 2011), forestry plans, plans for coal mining and state and local transport plans are subject to SEA in some states (Balla, 2009).

Subsequently, three EIA-like multi-project SEAs are introduced and discussed. These include the SEA for the Federal Transport Infrastructure Plan, the SEA for the Federal Transmission Grid Plan, and the SEA for the Elbe Flood Risk Management Plan. All three are compulsory SEAs according to the EIA Act. Geißler and Rehhausen (2014) showed that most plans and programmes in Germany can be considered programmes when using the definition provided by Arts et al. (2011) and Fischer (2002). This includes the three SEAs described below.

SEA for the Federal Transport Infrastructure Plan

The German Federal Transport Infrastructure Plan (FTIP) provides a framework for Federal project-based infrastructure investment planning. Within the planning process of the FTIP, existing transport infrastructure networks are analysed and suggestions (from local or state authorities) are considered for new or extended federal highways, federal railways and waterways. Each potential project is then subjected to a complex macroeconomic assessment. The core element of the assessment is a cost–benefit analysis (Fischer, 2006). Furthermore, potential individual projects are assessed in terms of environmental and spatial and urban impacts, using maps and associated impact matrices.

SEA requirements are met, based on the assessment of potential individual projects, as well as through cost–benefit analyses that include environmental parameters (e.g. amount of harmful emissions). In this context, it is important that only proposals with a positive cost–benefit ratio will have a chance of being funded through the federal budget later. The FTIP is supposed to be revisited every 10 to 15 years. Previous FTIP revisions, such as the one from 2003, already included 'environmental risk assessments' for individual projects. However, the FTIP 2030, which was issued in 2016, was the first FTIP to be subjected to formal SEA according to SEA Directive requirements.

All potential projects end up being categorised into 'first' and 'second priority'. 'First priority' projects are then transferred into federal plans for highways, railway lines and waterways. These have to be adopted by Federal Parliament as amendments to the associated three 'federal demand acts'. The need for 'first priority' projects cannot be challenged legally at subsequent planning levels. These projects are subsequently planned and financed from the federal budget. There are five-year reviews on whether projects remain economically and technically viable. These reviews are not subject to SEA.

As mentioned above and also according to the European Commission's SEA transport manual (European Commission DG TREN, 2005; following Fischer, 2002; 2006), the FTIP SEA approach can be classified as an EIA-like 'programme-SEA'. Even though the FTIP is situated at the highest administrative (i.e. federal) level and is dealing with three modes of transport, overarching transport development goals are not discussed. Whilst in theory this should happen at a higher policy level, this is currently missing. As a consequence, federal

transport planning has faced some serious criticism (see e.g. Bongardt and Hanusch, 2008; Fischer, 2006; Rehhausen and Stemmer, 2017). The FTIP itself states "that a distinction is made between the overarching objectives of transport policy resulting from transport and environmental policy programs and the derived objectives or solution strategies that the FTIP can pursue in practice. The latter are the basis for the prioritisation strategy of the FTIP 2030. The plan focuses primarily on those transport policy objectives that can be directly influenced by the further development of transport infrastructure" (Bundesministerium für Verkehr und Digitale Infrastruktur, 2016, p. 5). Whilst the missing policy gap is therefore acknowledged, and the underlying research study on the FTIP SEA clearly recommended the inclusion of policy-level assessments (Balla et al., 2012), nothing is currently done to address this shortcoming.

As is shown in Figure 2.2, the SEA for the FTIP consists of three main steps; (1) an environmental ('plausibility') appraisal of proposed individual projects, (2) an environmental module for the assessment of individual projects (including elements of the cost–benefit analysis) and (3) an environmental module for the overall plan appraisal (mainly adding up effects of individual projects). This is called the 'overall plan effect'. Alternatives can be assessed for intermodal transport solutions or for different transport modes separately (Balla and Günnewig, 2017).

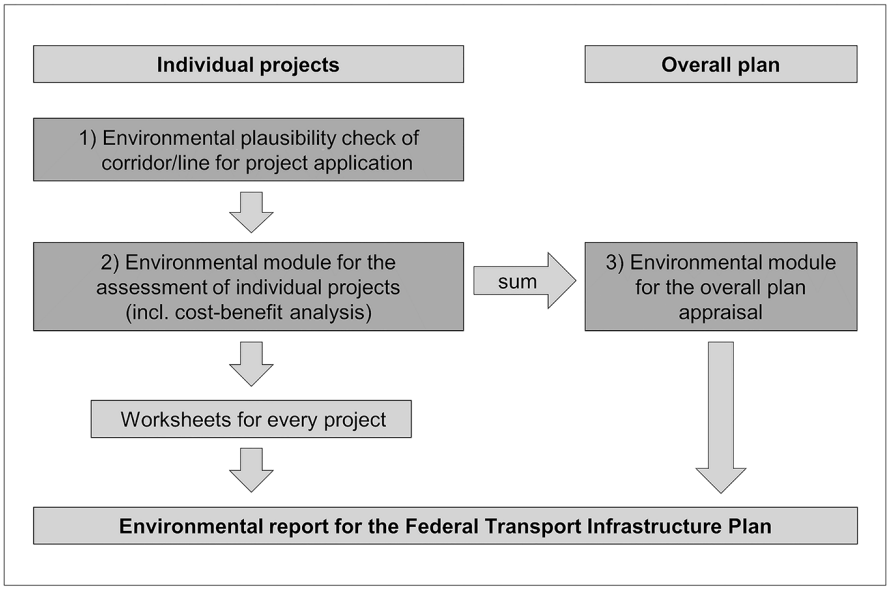

Figure 2.2 Main SEA assessment steps within the German FTIP

Source: Adapted from Balla and Günnewig (2017).

A total of more than 2,100 project proposals were covered in the FTIP 2030, including about 1,700 federal highways, 400 federal railways and 50 federal waterways. Potential projects are assessed with regard to avoiding certain environmental impacts that are spatial (e.g. crossing of Natura 2000 areas and flood plains) and in terms of 'cost-plausibility' (as a result

of cost–benefit analysis). The latter includes costs for environmental mitigation measures, such as noise protection or the costs and impacts of transiting through water protection areas. The environmental plausibility check results in recommendations on which projects need to go through further assessment. Assessments of each project proposal conclude with a project worksheet with details on all environmental impacts, monetised and non-monetised. Environmental effects of the overall plan are established. By merging the concerns of the individual projects for the overall plan level, cumulative effects of the FTIP are established. Moreover, it is possible to check the conformity of future FTIPs with environmental objectives, for example from the Federal Government's environmental programmes, e.g. in terms of land use or CO_2 reduction (Balla and Günnewig, 2017).

SEA for the Federal Plan for the Electricity Transmission Grid Demand

Federal-level planning of the national electricity transmission grid includes three planning stages; a Scenario Framework, Grid Development Plans and the Federal Plan for Transmission Grid Demand (DENA, 2013; Rehhausen et al., 2018; Weingarten and Hanusch, 2012). Based on a lead scenario described in the Scenario Framework, the Grid Development Plans "comprise proposals for transmission lines to be reinforced or newly build" (Rehhausen et al., 2018, p. 47). These transmission line proposals are confirmed by the Federal Network Agency. The confirmed list of transmission line projects – the draft Federal Plan for the Transmission Grid Demand – is then passed on to the Federal Government which needs to ratify the Grid Demand Plan as the 'Act on the Federal Requirements Plan'. The need for specific transmission line projects is thus determined. In accordance with the EIA Act 2019, only the Federal Plan for the Transmission Grid Demand is subject to a mandatory SEA. However, in practice "SEA is carried out for the Grid Development Plans" (Rehhausen et al., 2018, p. 47).

The Grid-demand SEA follows a multi-project approach. Initially, on the basis of specific environmental criteria the environmental impacts are established for each single transmission line proposal, and then summed up and analysed, using some basic statistical analysis (Federal Network Agency, 2019a). The environmental criteria for analysis are developed from environmental objectives. Furthermore, a 'hot spot' analysis of spatial accumulation of transmission line projects is conducted. Alternatives are also examined for each transmission line proposal. Frequently, these are macro-siting alternatives, but system alternatives have also been considered (e.g. reinforcements vs. new build, underground cables vs. overhead lines). The environmental report (Federal Network Agency, 2019b) contains project worksheets for each transmission line proposal that look similar to what is introduced in Figure 2.1. The worksheets sum up the results of the analysis of alternatives and the environmental assessment for each transmission line proposal and are used as a basis for subsequent corridor planning and assessment.

After initially neglecting SEA monitoring for the Federal Plan for the Transmission Grid Demand, the Federal Network Agency (2019a) recently introduced an SEA monitoring concept. This is built upon project-level monitoring which has now become mandatory due to the recent amendment of the EU EIA Directive (2014/52/EU). Underlying assumptions of the SEA are verified in subsequent corridor and project approval processes. Monitoring results might lead to some modifications of the SEA methodology for the Federal Plan for the Transmission Grid Demand, and results will be published every four years. The first report on the monitoring results is expected in 2023 (Federal Network Agency, 2019a). The monitoring

reports will hopefully be able to foster a better understanding of causes and environmental effects, and will also support better connections to be made between SEAs and EIAs.

SEA for the Elbe Flood Risk Management Plan

Flood Risk Management Plans highlight flood hazards and risks in specific areas and set out measures to handle flood risk (see also Chapter 13 by Mustow, 2021). The aim of the plans is to manage adverse potential impacts of flooding on human health, the environment, cultural heritage and economic activity (LAWA, 2019). The underlying EU Directives, that is, the Water Framework Directive and the Floods Directive, are based on six-year planning periods – so-called planning cycles. By the end of 2015, the Flood Risk Management Plans of the first cycle had been prepared on the basis of formerly existing flood hazard and risk maps. In the second cycle, the plans are to be reviewed and updated by 22 December 2021.

Flood risk management plans as well as water management plans are prepared for river basin districts, of which there are ten in Germany. The Elbe is the second largest river basin district and covers ten federal *Länder* with a catchment area of 96,269 km^2 (Umweltbundesamt, 2016). In cooperation with the German government, the associated ten states founded the 'River Basin Community Elbe' with the aim of coordinating the implementation of both the Water Framework and Floods Directives. This also includes the coordination of the associated SEA and the preparation of the environmental report for the Elbe Flood Risk Management Plan. Both the Flood Risk Management Plan and the SEA are carried out jointly across federal states' boundaries.

All development measures – i.e. 'projects' in the sense of the multi-project approach – that have the potential to significantly impact flood risk and that are included in the Flood Risk Management Plan are considered in the SEA. There is a nationwide catalogue of measures (i.e. 'projects'), covering the Water Framework Directive, the Floods Directive, and the Marine Strategy Framework Directive (LAWA, 2013; 2015). This catalogue of measures is presented as a table, indicating measures, types of pressures, and environmental goals. The catalogue includes 29 measures for managing and handling flood risk.

The SEA consists of two main steps. Firstly, an analysis of the environmental impacts of each of the 29 measures (i.e. 'projects') is undertaken. An appraisal is carried out for whether any measure can potentially lead to significant environmental impacts. For each measure a 'worksheet' (similar to Figure 2.1) is prepared, documenting the likely environmental effect of the measure with regard to a number of environmental objectives. The core of the 'worksheet' is a cause-and-effect matrix presenting potentially significant impacts (Figure 2.3). There is, however, an important difference to the other case studies. There is no information on the detailed location of the measures provided in the Flood Risk Management Plan. Rather, there is an allocation to designated area units of river basin districts.

Secondly, an assessment is undertaken for each of three main spatial aggregation levels of the river basin: (1) planning unit, (2) coordination area, and (3) total area (Hanusch et al., 2015). Owing to the large spatial area covered by the plan, a great quantity of data is available that needs to be analysed systematically. Based on the fundamental environmental analysis of the measures (i.e. 'projects') the environmental impacts are assessed by summing up the environmental impacts according to the allocation of measures in the designated area units of the river basin districts. Finally, the overall, cumulative environmental impact of the plan is identified. An ordinal four-step evaluation scheme is used, ranging from potentially very

Measure type 317 Dikes, dams, flood protection walls, mobile flood protection, dunes, beach walls **Environmental objectives**	**Impact factors**								
	Land take	Sealing of soils	Barrier effects	Visual effects	Change/ limitation of use	Change of drainage regime	Change of morphology	Change of hydrology	Immission into water bodies
Population/ human health									
- Securing the recreational value of nature and landscape	o	o	o	-	o	o	o	o	o
- Ensuring flood protection	o	o	o	o	o	+ +	o	o	o
Fauna, flora, biodiversity									
- Building biotope networks / continuity of rivers	-	o	-	o	o	o	-	o	o
- Protection of fauna, flora and biodiversity	-	o	o	o	o	o	- -	o	o

- - significant negative impact - negative impact o no/ neutral impact + + significant positive impact + positive impact

Figure 2.3 Cause and effect matrix of SEA for the Elbe Flood Risk Management Plan

Source: Hanusch et al. (2016).

positive impacts to potentially very negative impacts. The assessment relies on both expert judgement and mathematical methods and concludes with a plausibility check. Therefore, it is robust and highly transparent.

The way the Flood Risk Management Plan is designed limits any assessment of alternatives, as the plan contains 'ideal-typical' measures to achieve flood risk management goals. Due to the degree of abstraction of the plan and the rather vague description of the measures in the standardised catalogue, there is no point of reference for the further consideration of alternatives at this planning level. However, the environmental report of the Flood Risk Management Plan highlights the need for an assessment of alternatives at subsequent levels, especially for technical flood management measures with intensive land take (Hanusch et al., 2016).

BENEFITS AND CHALLENGES OF THE MULTI-PROJECT APPROACH TO SEA

In a tiered planning system (of policies, plans, programmes and projects), the multi-project approach is both beneficial and challenging. Whilst multi-project SEA has the ability to allow for easy tiering with project EIA, connecting it with policies is challenging, in particular when no SEA is applied at that level. Two of the analysed case studies (transport and transmission grid) are part of a planning system in which a conscious attempt is made to connect plans with projects. However, in the third case (flood management), this is different. Subsequent implementation of flood management measures is undertaken in different approval procedures that do not necessarily require EIA. For instance, the creation of retention basins comes without a requirement to conduct EIA. Furthermore, a number of flood management measures are classified as maintenance measures and thus are not subject to mandatory EIA. SEA therefore fulfils a particular important role, as environmental impacts are not addressed anywhere else.

Connections between SEA and EIA are particularly strong when monitoring requirements are formulated in SEA. Furthermore, due to the assessment method applied, aggregated environmental impacts of all projects are equal to the overall environmental impact of the plan or programme. This means project level monitoring can also be used to monitor the plan's or programme's environmental effects. Whilst SEA-level monitoring may not lend itself to support project (EIA) monitoring, in particular due to scale issues, this is not a problem when using project monitoring data to feed into SEA monitoring. This is practised for the Federal Plan for the Transmission Grid Demand. In this context, what is of importance is that the monitoring concept for the plan or programme needs to set standards for project-level monitoring (e.g. criteria, methods and duration). These standards are necessary to produce comparable environmental monitoring results for each project. The comparability of monitoring results is necessary when the conclusions for the plan or programme are supposed to be drawn.

A challenge for tiering can be lengthy planning consent procedures of projects. This means plans or programmes may be revised before projects are actually implemented and learning from past experience is therefore not possible. For instance, the Elbe Flood Risk Management Plan was approved in 2015. The planning procedure and its implementation for e.g. an inner-city flood alleviation channel which is subject to EIA will normally be between 15 and 20 years (preparation, approval procedure, detailed design and construction). Only after the implementation of the project will it be possible to reliably judge actual environmental effects. This is the same for many projects of the FTIP. For example, some projects of the FTIP 2003 are still under construction.

Whilst the Federal Plan for the Transmission Grid Demand is revised every two years, project implementation takes much longer. This is further complicated by rapidly changing context conditions. For instance, political preferences for projects can change when new governments are elected. As a consequence, plans and projects may be out of sync. Amongst other things (e.g. potentially creating confusion), this means that cause–effect relationships are difficult to identify, especially across planning levels and over long time periods. This is exacerbated in the absence of monitoring results (Hanusch, 2009).

A benefit of the multi-project approach is that the underlying logic of this approach within tiered planning systems is easy to understand. It follows the simple assumption that project-level impacts can be summed up. This can be easily communicated to decision-makers and the public. However, from a scientific point of view it is questionable whether simply summing up project-level impacts is sufficient, in particular as potential indirect and synergistic effects are not considered. Therefore, next to adding up impacts of project proposals, a more in-depth analysis of impacts of expected 'hot spots' is recommended (see González, 2017 and Chapter 6 by González and Geneletti, 2021) and an objective-led evaluation of the overall impacts should be attempted (Scholles et al., 2017). The case studies include some of these more in-depth analyses.

The multi-project approach represents a pragmatic view of SEA. If projects are identified in the plan or programme, identifying and describing the projects' environmental impacts is straightforward and the approach comes with some clear instructions to SEA practitioners. Furthermore, it is possible to generate SEA results in a transparent manner. Often, spatial information is available for each project, allowing for some spatial assessment of environmental impacts and the assessment of site alternatives. However, different data quality standards in different *Länder* can make comparable project level assessments within federal SEAs tricky (Rehhausen et al., 2018).

Alternatives assessment is still a challenge within the multi-project approach. Strategic thinking as introduced by Partidário (2012; see also Chapters 3 and 4 by Hayes and Fischer, 2021 and Partidário, 2021) is not reflected in multi-project SEA and wider policy alternatives are not within the remit of this approach since the plan or programme subject to a multi-project SEA usually does not include strategic objectives (as the examples presented in this chapter show). The three case studies show that multi-project SEAs usually focus on site alternatives only. Fundingsland Tetlow and Hanusch (2012) found a sizeable consensus in the academic literature that the way in which SEA has evolved is positive – from a largely EIA-based position with responsive mechanisms to more proactive processes of developing sustainable solutions as an integral part of strategic planning activities. Therefore, the introduction for policy assessment-like SEA is necessary to address more strategic alternatives (Fundingsland Tetlow and Hanusch, 2012; Geißler, 2013; Rehhausen, 2019). However, this needs to happen in an interlinked manner with other tiers, including multi-project SEA, as otherwise there will be a gap between policy and project levels which will be difficult to bridge. This, we believe, would render policy assessment-like SEA ineffective.

CONCLUSIONS

In Germany, multi-project SEA is the most common type of SEA applied (Geißler and Rehhausen, 2014). Three multi-project SEAs were introduced in this chapter; two infrastructure SEAs (transport and energy; where the focus is on potential projects) and one flood risk management plan SEA (where the focus is on potential flood risk alleviation measures). Multi-project SEA allows for clear connections to be made between SEA and subsequent project EIAs that can focus on the significant environmental impacts identified in SEA in further detail. If projects are assessed in SEA that will not be subject to subsequent EIA, then SEA will be the only level at which associated environmental impacts will be considered.

A multi-project SEA approach is easy to understand and ensuing messages are easy to communicate to decision-makers and the public. However, the assessment of alternatives is often limited to siting alternatives rather than demand or system alternatives (Fischer, 2006; Geißler 2013; Köppel et al., 2018; Rehhausen, 2019; Rehhausen et al., 2018). These need to be assessed at higher tiers. The case studies introduced in this chapter show how to make cumulative effects transparent and consider the effects of the overall plan. However, the consideration of cumulative effects is often limited to adding up impacts of project proposals, while more complex synergistic effects are not considered (Geißler, 2013; Rehhausen and Stemmer, 2017).

Multi-project SEA is a suitable approach for plans and programmes that are based on suggestions for potential projects. However, strategic considerations with regard to, for example, housing needs, overall energy or transport demands, are not considered. This is why policy assessment-like SEA is needed to address higher tier issues and impacts. EIA-like multi-project SEAs in Germany facilitate "informed decision-making as the responsible agencies use the environmental report, the interaction with consultancies, and the participation processes as a source of information" (Rehhausen, 2019, p. 9). Furthermore, and crucially, they fulfil a key role in connecting policy with projects.

REFERENCES

Arts, J., Tomlinson, P. and Voogd, H., 2011. Planning in tiers? Tiering as a way of linking SEA and EIA, in B. Sadler, R. Aschemann, J. Dusik, T. B. Fischer, M. R. Partidário and R. Verheem (eds), *Handbook of Strategic Environmental Assessmen*t, pp. 415–33. London.

Aschemann, R., 1999. *Endbericht zum Pilotprojekt Strategische Umweltprüfung (SUP) des Flächenwidmungsplanes 3.0 (FWP) der Stadtgemeinde Weiz*, Arbeitsgruppe Wissenschaftsladen Graz/Büro Arch. DI Hoffmann, Graz.

Balla, S., 2009. Übersicht zur SUP-Gesetzgebung der Länder, *UVP-report* 23 (4): 185–8.

Balla, S. and Günnewig, D., 2017. Von der Projektbewertung zum Umweltbericht – Erfahrung zur Strategischen Umweltprüfung für den Bundesverkehrswegeplan 2030, *UVP-report* 31 (4): 290–99.

Balla, S., Günnewig, D. and Hanusch, M., 2012. Strategische Umweltprüfung für den Bundesverkehrswegeplan, *Internationales Verkehrswesen* 64: 2–6.

Balla, S., Peters, H.-J. and Wulfert, K., 2010. *Leitfaden zur Strategischen Umweltprüfung*. https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Umweltpruefungen/sup_leitfaden_lang_bf.pdf. Accessed 3 October 2019.

Bongardt, D. and Hanusch, M., 2008. Integration einer Strategischen Umweltprüfung in den BVWP 20XX, in U. Becker, R. Gerike and T. Belter (eds), *Perspektiven der deutschen Verkehrsplanung*, pp. 32–41. UBA-Texte 45/08, Berlin.

Bundesministerium für Verkehr und Digitale Infrastruktur, 2016. *Bundesverkehrswegeplan 2030*. https://www.bmvi.de/SharedDocs/DE/Publikationen/G/bundesverkehrswegeplan-2030-gesamtplan.pdf?__blob=publicationFile. Accessed 15 May 2020.

Dalal-Clayton, B. and Sadler, B., 2005. *Strategic Environmental Assessment – A Sourcebook and Reference Guide to International Experience.* Earthscan, London.

DENA, 2013. *Planung und Genehmigung von Ausbaumaßnahmen im Übertragungsnetz*. http://www.effiziente-energiesysteme.de/themen/stromnetze/netzausbau.html. Accessed 18 November 2015.

EIA Act, 1990: *Gesetz zur Umsetzung der Richtlinie des Rates vom 27. Juni 1985 über die Umweltverträglichkeitsprüfung bei bestimmten öffentlichen und privaten Projekten (85/337/EWG) vom 12. Februar 1990* (BGBl. I S. 205).

EIA Act, 2019. *Gesetz über die Umweltverträglichkeitsprüfung in der Fassung der Bekanntmachung vom 24. Februar 2010 (BGBl. I S. 94). Zuletzt geändert durch Artikel 22 des Gesetzes vom 13. Mai 2019* (BGBl. I S. 706).

EU EIA Directive, 2014. *Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment*, *Official Journal of the European Union* L124–1.

European Commission DG TREN, 2005. *The SEA Manual: A Sourcebook on Strategic Environmental Assessment of Transport Infrastructure Plans and Programmes*. https://ec.europa.eu/environment/archives/eia/sea-studies-and-reports/pdf/beacon_manuel_en.pdf. Accessed 15 May 2020.

Faith-Ell, C. and Fischer, T.B., 2021. Strategic environmental assessment in transport planning, in: Fischer, T.B. and González, A. (eds), *Handbook on Strategic Environmental Assessment*, Cheltenham: Edward Elgar (chapter 11).

Federal Network Agency, 2019a. *Bedarfsermittlung 2019–2030. Entwurf des Umweltberichtes – Teil 1 Strategische Umweltprüfung auf Grundlage des 2. Entwurfs des NEP Strom*. https://data.netzausbau.de/2030–2019/UB/Umweltbericht_E_Teil_I_final.pdf. Accessed 3 November 2019.

Federal Network Agency, 2019b. *Bedarfsermittlung 2019–2030. Entwurf des Umweltberichtes – Teil II Steckbriefe*. https://data.netzausbau.de/2030–2019/UB/Umweltbericht_E_Teil_II_final.pdf. Accessed 3 November 2019.

Fischer, T. B., 2002. Towards a more systematic approach to policy, plan and programme environmental assessment – some evidence from Europe, in S. Marsden and S. Dovers (eds), *SEA in Australasia*, pp. 99–113, Sydney Place Federation Press, Sydney.

Fischer, T. B., 2003. Strategic environmental assessment in post-modern times, *Environmental Impact Assessment Review* 23(2): 155–70.

Fischer, T. B., 2006. SEA and transport planning: towards a generic framework for evaluating practice and developing guidance, *Impact Assessment and Project Appraisal* 24 (3): 183–97.

Fischer, T. B., 2007. *Theory and Practice of Strategic Environmental Assessment: Towards a More Systematic Approach*, Earthscan, London.

Fischer, T. B., Gazzola, P., Jha-Thakur, U., Kidd, S. and Peel, D., 2009. Learning through EC Directive-based SEA in spatial planning? Evidence from the Brunswick region in Germany, *Environmental Impact Assessment Review* 29 (6): 421–8.

Fischer, T.B. and González, A., 2021. Conclusions: towards a theory of strategic environmental assessment?, in: Fischer, T.B. and González, A. (eds), *Handbook on Strategic Environmental Assessment*, Cheltenham: Edward Elgar (chapter 27).

Fischer, T. B. and Phylip-Jones, J., 2007. *SEA of the Fife Supplementary Planning Guidance for Renewable Energies*, in SEA – materials for China's 'International Conference on Strategic Environmental Assessment (SEA)', SEPA. http://content.undp.org/go/cms-service/download/asset/?asset_id=2083586. Accessed 15 July 2020.

Fundingsland Tetlow, M. and Hanusch, M., 2012. Strategic environmental assessment: the state of the art, *Impact Assessment and Project Appraisal* 30 (1), 15–24.

Geißler, G., 2013. Strategic environmental assessments for renewable energy development – comparing the United States and Germany, *Journal of Environmental Assessment Policy and Management* 15 (2): 1340003.

Geißler, G., Dahmen, M. and Köppel, J., 2021. Strategic environmental assessment in the energy sector, in: Fischer, T.B. and González, A. (eds), *Handbook on Strategic Environmental Assessment*, Cheltenham: Edward Elgar (chapter 12).

Geißler, G. and Rehhausen, A., 2014. Wie strategisch ist die Strategische Umweltprüfung (SUP)? Zur SUP-Anwendung in Deutschland und den USA, *UVP-report* 28 (3–4): 119–27.

Geißler, G., Rehhausen, A., Fischer, T. B. and Hanusch, M., 2019. Effectiveness of strategic environmental assessment in Germany? – meta-review of SEA research in the light of effectiveness dimensions, *Impact Assessment and Project Appraisal* 37 (3–4): 219–32.

González, A., 2017. Mapping environmental sensitivity: a systematic online approach to support environmental assessment and planning, *Environmental Impact Assessment Review*, 66: 86–98.

González, A., 2021. Strategic environmental assessment of spatial land use plans, in: Fischer, T.B. and González, A. (eds), *Handbook on Strategic Environmental Assessment*, Cheltenham: Edward Elgar (chapter 10).

González, A. and Geneletti, D., 2021. GIS-based strategic environmental assessment, in: Fischer, T.B. and González, A. (eds), *Handbook on Strategic Environmental Assessment*, Cheltenham: Edward Elgar (chapter 6).

Hanusch, M., 2009. *SUP-Monitoring in der Regionalplanung*, Erich Schmidt Verlag, Berlin.

Hanusch, M. and Fischer, T. B., 2011. SEA and landscape planning, in B. Sadler, R. Aschemann, J. Dusik, T. B. Fischer, M. Partidário and R. Verheem (eds), *Handbook of Strategic Environmental Assessment*, pp. 257–73, Earthscan, London.

Hanusch, M., Fundingsland Tetlow, M., Geneletti, D., Hrabar, M., Jurkeviciute, A. and Gardner, R., 2016. Sector-specific SEAs: are we getting it right? In B. Sadler and J. Dusik (eds), *European and International Experiences of Strategic Environmental Assessment*, pp. 202–25, Earthscan, London.

Hanusch, M., Wild, G., Furche, K., Hähre, S. and Meyer, C., 2015. *Strategische Umweltprüfung zum "Hochwasserrisikomanagementplan gem. § 75 WHG bzw. Artikel 7 der Richtlinie 2007/60/EG über die Bewertung und das Management von Hochwasserrisiken für den deutschen Teil der Flussgebietseinheit Elbe"* im Auftrag der Flussgebietsgemeinschaft Elbe. https://www.fgg-elbe.de/files/Downloads/HWRM_RL/anh/hwrmp/Ergebnisse-2015/Umweltbericht_HWRM_und_Anhaenge.pdf. Accessed 15 May 2020.

Hayes, S.J. and Fischer, T.B., 2021. Objectives *for*, *of* and *in* strategic environmental assessment, in: Fischer, T.B. and González, A. (eds), *Handbook on Strategic Environmental Assessment*, Cheltenham: Edward Elgar (chapter 3).

Hübler, K.-H., Riehl, C. and Winkler-Kühlken, B., 1995. *UVP in der Bauleitplanung – Praxisprobleme und Lösungsvorschläge, Band 1: Leitfaden zur UVP in der Bauleitplanung mit dem Schwerpunkt auf der Ebene der Flächennutzungsplanung*, Reihe Berichte des Umweltbundesamtes 6/95, Umweltbundesamt, Berlin.

IAEA [International Atomic Energy Agency], 2018. *Strategic Environmental Assessment for Nuclear Power Programmes – Guidelines*, International Atomic Energy Agency, Vienna, https://www.iaea.org/publications/12251/strategic-environmental-assessment-for-nuclear-power-programmes-guidelines.

Jiliberto, R., 2021. Strategic environmental assessment in Chile: an unfulfilled strategic promise, in: Fischer, T.B. and González, A. (eds), *Handbook on Strategic Environmental Assessment*, Cheltenham: Edward Elgar (chapter 24).

Köppel, J., Geißler, G., Rehhausen, A., Wende, W., Albrecht, J., Syrbe, R.-U., Magel, I., Scholles, F., Putschky, M., Hoppenstedt, A. and Stemmer, B., 2018. *Strategische Umweltprüfung und (neuartige) Pläne und Programme auf Bundesebene – Methoden, Verfahren und Rechtsgrundlagen*. UBA-Texte 81/2018. https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2018–10–18_texte_81–2018_sup-bundesplanung.pdf. Accessed 3 October 2019.

LAWA [Bund/Länder-Arbeitsgemeinschaft Wasser], 2013. *Empfehlungen zur Aufstellung von Hochwasserrisikomanagementplänen*. https://www.lawa.de/documents/empfehlungen_zur_aufstellung_von_hwrmpl_mit_anlagen_1552299352.pdf. Accessed 15 May 2020.

LAWA [Bund/Länder-Arbeitsgemeinschaft Wasser], 2015. *LAWA-BLANO Maßnahmenkatalog* (WRRL,HWRMRL, MSRL). http://www.wasserblick.net/servlet/is/142651/. Accessed 15 May 2020.

LAWA [Bund/Länder-Arbeitsgemeinschaft Wasser], 2019. *Empfehlungen zur Aufstellung, Überprüfung und Aktualisierung von Hochwasserrisikomanagement-plänen*. https://www.lawa.de/documents/lawa-empfehlung-hwrmp_1588147036.pdf. Accessed 15 May 2020.

Mustow, S.E., 2021. Strategic environmental assessment in the water sector, in: Fischer, T.B. and González, A. (eds), *Handbook on Strategic Environmental Assessment*, Cheltenham: Edward Elgar (chapter 13).

Nielsson, M. N. and Dalkmann, H., 2001. Decision making and strategic environmental assessment, *Journal of Environmental Assessment Policy and Management* 3 (3): 305–28.

Noble, B. F. and Nwanekezie, K., 2016. Conceptualizing strategic environmental assessment: principles, approaches and research directions, *Environmental Impact Assessment Review* 62: 165–73.

Partidário, M.R., 2012. *Strategic Environmental Assessment Better Practice Guide: Methodological Guidance for Strategic Thinking in SEA*. http://ec.europa.eu/environment/eia/pdf/2012%20SEA_Guidance_Portugal.pdf. Accessed 14 November 2017.

Partidário, M.R., 2021. Strategic thinking for sustainability (ST4S) in strategic environmental assessment, in: Fischer, T.B. and González, A. (eds), *Handbook of Strategic Environmental Assessment*, Cheltenham: Edward Elgar (chapter 4).

Rehhausen, A., 2019. The art of underperforming SEA – symptomatic narratives from Germany, *Environmental Impact Assessment Review* 78: 106280.

Rehhausen, A., Köppel, J., Scholles, F., Stemmer, B., Syrbe, R.-U., Magel, I., Geißler, G. and Wende, W., 2018. Quality of federal level strategic environmental assessment – a case study analysis for transport, transmission grid and maritime spatial planning in Germany, *Environmental Impact Assessment Review* 77: 1–36.

Rehhausen, A. and Stemmer, B., 2017. Strategische Umweltprüfung auf Bundesebene: Aktuelle Berücksichtigung von kumulativen Wirkungen beim Infrastrukturausbau, *UVP-report* 31 (2): 118–26.

Retief, F., Jones, C. and Jay, S., 2008. The emperor's new clothes – reflections on strategic environmental assessment (SEA) practice in South Africa, *Environmental Impact Assessment Review*, 28: 504–14.

Riehl, C. and Winkler-Kühlken, B., 1995. *Environmental Impact Assessment in Area Master Planning: Practical Problems and Suggested Solutions*, Institut für Stadtforschung und Strukturpolitik GmbH, Berlin.

Scholles, F., Baumüller, J., Bohl, J., Dahme, K. M., Fahnenbruch, B., Hanusch, M., Hartlik, J., Koch, M., Köppel, J., Peters, W., Rehhausen, A., Weiland, U. and Wende, W., 2017. Umweltprüfung im

Klima- und Gesetzeswandel. Einführung und Überblick über den 13. UVP-Kongress 2016, *UVP-report*, 31 (2): 67–88.

Scott, P., 2021. Integrating appropriate assessment and strategic environmental assessment, in: Fischer, T.B. and González, A. (eds.). *Handbook on Strategic Environmental Assessment*, Cheltenham: Edward Elgar (chapter 15).

Umweltbundesamt, 2016. *Nationaler Teil der internationalen Flussgebietsgemeinschaft Elbe*. https://www.umweltbundesamt.de/sites/default/files/medien/1968/dokumente/steckbrief_flussgebietseinheit_elbe.pdf. Accessed 15 May 2020.

Verheem, R. and Dusik, J., 2011. A hitchhiker's guide to SEA: are we in the same planet? Opening plenary. Prague, 21–3 September: IAIA Special Conference on SEA.

Weingarten, E. and Hanusch, M., 2012. Einführung in das Schwerpunktthema Netzausbau – Verfahren und Ebenen, *UVP-report* 26 (3–4): 134–7.