
VI.18 Substitution: from alternatives to ecological proportionality

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Abstract

Searching for the best environmental options is a modern approach of environmental regulation which has traditionally concentrated its oversight on the option singled out by the operator. The concept, called substitution or alternatives assessment, is still under development. The present chapter examines the different shapes the concept was given by environmental legislation: there may be pressure for existing activities to be replaced by less adverse substitutes, planned activities may be dismissed if less adverse alternatives are available. The range of alternatives that are to be considered may be broad or narrow, and their determination may be in the operator's discretion or guided by objective criteria. Whether an alternative is preferable, may be dependent on a simple comparison of environmental effects, or a more complex balancing of environmental and economic interests. In conclusion the article offers an understanding of the overall concept of substitution/alternatives assessment as being imbedded in an emerging principle of ecological proportionality, that is, a requirement that an activity having potentially adverse environmental effects must pursue a legitimate objective and be effective, necessary and balanced.

Keywords

Substitution, alternatives, risk-benefit analysis, chemicals, Natura 2000, Water Framework Directive

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VI.18.1 Introduction

Environmental law has traditionally examined the environmental effects of activities and limited them in order to mitigate unwished for adverse consequences. The object of such oversight (such as the utilization of dangerous products or the operation of dangerous installations) has been either an existing or a new activity, resulting in a possible termination of the activity in the former case, and in a possible denial of authorization in the latter. In any case the checking and regulation has focused on the specific activity undertaken or planned by the operator. The authorities had to accept the choice of the operator and were only empowered to determine whether the chosen activity met or exceeded the assumed thresholds. Picturing this, the operator would be the master within a circle, the outer limits being set by the public authorities.

A modern approach looks into that circle of self-determination inquiring if other options are available that may cause less environmental risk than the chosen one. This brings a wider range of entrepreneurial activities into administrative oversight, rather than only the one chosen by the operator. It is hoped that drawing different options of activities into the regulatory discourse will provide an opportunity of better environmental protection.

The way that this is being done differs depending on whether the activity under scrutiny is already existing or only projected. If an existing activity is found to be harmful it is a candidate for being replaced by a more benign option. This is commonly called substitution. In the case of a new activity, the law may provide that an approval shall be refused if a less harmful option is available. This is commonly called alternatives assessment. It may as well be named substitution of a planned activity. If so, the first case may be called retrospective and the latter case prospective substitution.

From a historical perspective, substitution (or alternatives assessment) has its origin in sectors of known and hard to avoid adverse effects, the oldest sector probably being production processes that are dangerous for workers and neighborhoods. Since then they have moved to other sectors including product-related law and nature protection law.

The strength of the push towards better options of course depends on the concrete legislative design. The push is strong if the law establishes a duty to develop other options and provides tools for the enforcement of that duty. It is weak if other options shall only be taken into consideration by operators, or if a dangerous activity may only be prohibited provided that another option is readily available. There is room between strong and weak variants to give the scheme different shapes. We will now look at them in more detail. This shall be done with a view to detecting hidden general structures of the scheme.

When browsing the relevant legislation we will concentrate on regulatory instruments and disregard the various promotional instruments that foster better technology through tax reduction, subsidies, R&D infrastructure, public procurement, etc.; neither do we examine the same instruments, if they instead incentivize an environmentally destructive technology.

VI.18.2 Forms of substitution/alternatives assessment*VI.18.2.1 Basic duty of operators to search for substitution/alternatives*

Regulatory law may establish basic duties of operators to develop, or acquire, or at least consider better substitutes/alternatives when performing existing or projecting new activities.

Concerning safety at work, Article 6(2) of Council Directive 89/331/EEC¹ lists as one 'general principle of prevention' the duty of employers to 'replac[e] the dangerous by the non-dangerous or less dangerous'. More specifically, Article 4(1) Council Directive 90/394/EEC² provides:

The employer shall reduce the use of a carcinogen at the place of work, in particular by replacing it, in so far as is technically possible, by a substance, preparation or process which, under its conditions of use, is not dangerous or is less dangerous to workers' health or safety, as the case may be.

Concerning industrial processes, Article 10 of the IPPC Directive states as a principle that 'best available techniques are applied', these being defined in Article 1(10) as 'the most effective and advanced stage in the development of activities and their methods of operation . . . to prevent and . . . to reduce emissions and the impact on the environment as a whole'.³

In relation to the manufacture and bringing on the market of chemical substances, Article 55 REACH Regulation establishes as the 'aim of authorization and consideration for substitution' 'that the risks from substances of very high concern are . . . progressively replaced by suitable alternative substances or technologies where these are economically and technically viable'.⁴

Those basic duties are not self-executing as such but merely programmatic, being meant as encouragement and reference for administrative orders or authorization. Even in this weaker form they can nevertheless serve as standards for negligence in case of tort liability.

VI.18.2.2 Lists indicating the need for substitutes/alternatives

The compilation of lists of unwanted products is a frequent way to initiate further action. One example is Annex XIV to the EU REACH regulation. Annex XIV comprises substances of very high concern (SVHC), such as those classified as highly carcinogenic,

¹ Council Directive of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (89/391/EEC), OJ L 183, 29.6.1989, p. 1.

² Directive 90/394/EEC of the Council of 28 June 1990 on the protection of workers from the risks related to exposure to carcinogens at work (Sixth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC), OJ L 196, 26.07.1990, p. 1.

³ Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast), OJ L 334, 17.12.2010, p. 17. The rule is in many ways qualified by technical and economic concerns which are not of interest at this stage of analysis.

⁴ Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), OJ L 396, 30.12.2006, p. 1.

mutagenic, teratogenic (CMT) and/or persistent, bio-accumulative and toxic (PBT).⁵ Operators must apply for authorization to market such substances and submit a dossier comprising not only data on the substance itself, but also 'information on alternative substances and techniques'.⁶ The very compilation of the list is however said to already have an educatory effect,⁷ apart of course from the anticipatory effect of the authorization requirement for the listed substances.⁸

The listing of unwanted substances acting as a trigger for the operators to take their own initiatives is also a frequent occurrence in the US. Thus, a priority list of high-risk substances was established and is permanently amended, the risk assessment and eventual regulation of which is of primary concern.⁹ It can be expected that the mere listing of such substances is an incentive for the relevant industry to look for alternatives. On the State level a list of 'higher hazard substances' triggering a number of use reduction measures has been put together in the state of Massachusetts, based on the State's Toxics Use Reduction Act. It is accompanied by lists of 'more hazardous substances' and 'less hazardous substances' that are meant as informational resources for companies.¹⁰

There are also positive lists or labeling of substances considered as less harmful, such as, for instance, the so-called low-risk active substances under the EU Plant Protection Regulation.¹¹

VI.18.2.3 State-based infrastructure for the search for substitutes/alternatives

Sometimes the law demands that a special organizational infrastructure shall be established for the search for substitutes/alternatives. For instance, under the IPPC Directive, a forum composed of representatives of the Member States, the industries concerned and NGOs was set up to address:

- (a) the performance of installations and techniques in terms of emissions ... consumption and nature of raw materials, water consumption, use of energy and generation of waste;
- (b) ... economic and technical viability and developments therein;
- (c) best available techniques and emerging techniques identified after considering the issues mentioned in points (a) and (b).¹²

The forum shall draw conclusions on the best available techniques (BATs), which will be adopted in accordance with the regulatory procedure, that is, by Commission

⁵ REACH Regulation (EC) No. 1907/2006 (n 4, above), Articles 56 to 59.

⁶ *Ibid*, Annex XV, Sec. 2. See further *infra*.

⁷ Hansson, Molander and Rudén (2011) 454–460.

⁸ Regulation (EC) No. 1907/2006 (n 4, above), Articles 60 to 64.

⁹ Toxic Substances Control Act (TSCA), 15 USC Ch. 53, Subch. I § 2603(e)(1)(A), § 2605(b) (1) Toxic Substances Control Act (TSCA), as amended by the Frank R. Lautenberg Chemical Safety for the 21st Century Act of 2016, <https://www.epa.gov/sites/production/files/2016-06/documents/bills-114hr2576eah.pdf> (accessed 4.12.2016).

¹⁰ For the lists and their aims, see at <https://www.turi.org/>.

¹¹ Regulation (EC) No. 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market, OJ L 309/1 (2009), p. 1, Articles 22 and 47.

¹² Directive 2010/75/EU (n 3, above), Article 13(2).

decision based on the involvement of Member States' sectoral administrative bodies.¹³ The BAT conclusions serve as reference for setting the permit conditions.¹⁴

VI.18.2.4 Phasing out candidates for substitution

Lists of unwanted substances are often the basis for regulatory action that brings alternatives to the fore. Such action may consist of subjecting the listed activities to a specific authorization requirement, or impeding the prolongation of an existing authorization, or phasing authorizations out by sequential termination.

Annex XIV of the REACH Regulation is once more a case in point. Operators that have a practice of bringing an Annex XIV substance onto the market must, by a fixed deadline, file an application for authorization. Operators who newly plan to bring an Annex XIV substance onto the market need to obtain a prior authorization. According to Article 62(4) REACH Regulation, the dossier submitted with the application must include:

- (e) an analysis of the alternatives, considering their risks and the technical and economic feasibility of substitution and including, if appropriate, information about any relevant research and development activities by the applicant;
- (f) where the analysis referred to in point (e) shows that suitable alternatives are available, taking into account the elements in Article 60(5), a substitution plan including a timetable for proposed actions by the applicant.

According to Article 64(2) REACH Regulation, information on alternative substances or technologies may also be submitted by interested third parties.

Not only must the submitted dossier include information on alternatives, the criteria applied in the authorization must also refer to the existence of alternatives. According to Article 60(4) REACH Regulation, for Annex XIV substances:

An authorisation may only be granted if it is shown that socio-economic benefits outweigh the risk to human health or the environment arising from the use of the substance and if there are no suitable alternative substances or technologies.

In short, if a suitable alternative substance or technology is available, the placing on the market of a substance of very high concern (SVHC) cannot be authorized, or it may be authorized only for a certain period based on a substitution plan of the applicant.

In the US a similar scheme applies. Unwanted substances are subjected to phasing out measures, depending on whether alternatives exist. The Administrator shall within certain deadlines propose and adopt a rule for chemical substances scoring high in terms of persistence and bioaccumulation. This rule shall take regulatory action, which may include the prohibition of the manufacture and/or distribution in commerce of a substance. In doing so the Administrator

shall consider, to the extent practicable, whether technically and economically feasible alternatives that benefit health or the environment, compared to the use so proposed to be prohibited

¹³ Ibid, Article 13(5).

¹⁴ Ibid, Article 14(3).

or restricted, will be reasonably available as a substitute when the proposed prohibition or other restriction takes effect.¹⁵

There is a difference in legal technique, though. The producer or trader of the substances is subject to an authorization requirement in the EU, while in the US the Administrator must take the regulatory initiative. This has important implications for the burden of proof which in the EU lies with the producer/trader, while in the US the authority bears it, being only entitled to require the submission of additional information if necessary.¹⁶ Furthermore, the TSCA does not require that the manufacturer/distributor must submit information on alternatives. Presumably this has implications not only in the situation when the Administrator considers prohibiting a substance, but also when an exemption for critical or essential uses shall be granted, which is possible, if no economically and technically feasible safer alternative is available.¹⁷ With fuller information on alternatives, the Administrator will probably be more inclined to prohibit a substance and reject an exemption.

The phasing out of unwanted activities through substitution by alternatives is not only frequent in relation to products, but also concerning industrial processes. For instance, under the EU IPPC Directive, combustion plants that were found to be dangerous for their emission of (inter alia) sulfur dioxide were subjected to a phasing out scheme. This was based on the fact that a safer technology was available, but time for adaptation should be granted. New installations were to meet the new strict standards, while existing installations were granted higher emission thresholds for certain time periods.¹⁸

VI.18.2.5 Checking new activities in view of alternatives

EU plant protection law provides that active substances with certain hazardous properties shall be identified as 'candidates for substitution'.¹⁹ If a new plant protection product containing such a candidate is placed on the market, the authorization must be rejected if a safer alternative exists. The provision reads as follows:

A comparative assessment shall be performed by Member States when evaluating an application for authorization for a plant protection product containing an active substance approved as a candidate for substitution. Member States shall not authorize or shall restrict the use of a plant protection product containing a candidate for substitution for use on a particular crop where the comparative assessment weighing up the risks and benefits, as set out in Annex IV, demonstrates that:

(a) for the uses specified in the application an authorized plant protection product, or a

¹⁵ Toxic Substances Control Act (TSCA), 15 USC Ch. 53, Subch. I § 2605(c)(2)(C) Toxic Substances Control Act (TSCA), as amended by the Frank R. Lautenberg Chemical Safety for the 21st Century Act of 2016, <https://www.epa.gov/sites/production/files/2016-06/documents/bills-114hr2576eah.pdf> (accessed 4.12.2016).

¹⁶ TSCA § 2603(2)(A)(ii) together with § 2605(a).

¹⁷ TSCA § 2605(g)(1)(A).

¹⁸ Directive 2010/75/EU (n 3, above) Article 30(2) with Annex V Part I No. 2. In Germany, the scheme was transformed and specified by the Regulation of Large Combustion Installations (Verordnung über Großfeuerungsanlagen – 13. BImSchV).

¹⁹ Regulation (EC) No 1107/2009 (n 11, above).

non-chemical control or prevention method, already exists which is significantly safer for human or animal health or the environment; . . .

The checking of alternatives is more frequently foreseen in process-related law than in the law on products. The broadest scope of application can be found in the projects that are subject to an environmental impact assessment (EIA). From the very beginning of EIA legislation the consideration of alternatives has been part of the EIA obligations. US law has pioneered this. Alternatives testing had been introduced as a requirement of EIA already in the National Environmental Policy Act of 1969, according to which all agencies of the Federal Government are required to:²⁰

- (C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on –
- (i) the environmental impact of the proposed action,
 - (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
 - (iii) alternatives to the proposed action

The US model was gradually taken up by many other states including the EC/EU. Under the EU EIA-Directive an EIA must include

a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;²¹

The requirement of an EIA for dangerous projects has meanwhile even been declared as a rule of international customary law. However, its content was not specified,²² so that it is unclear if the checking of alternatives is part of the rule.

The assessment of alternatives is a requirement also in several sectoral EU environmental legislative acts. For instance:

- Member States may derogate from the obligation to ensure good surface water quality, if the environmental and socio-economic needs served by water uses cannot be achieved by a significantly better environmental option not entailing disproportionate costs.²³
- If within the European network of protected areas – called Natura 2000 – a project causes significant adverse effects, it is prohibited, but may exceptionally be

²⁰ National Environmental Policy Act (NEPA), 42 USC § 4332.

²¹ Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment, OJ L 26, 28.1.2012, p. 1, as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014, OJ L 124/1 (2014), Article 5(1)(d).

²² Cf. ICJ, Case concerning Pulp Mills on the River Uruguay (*Argentina v Uruguay*), Judgment of 20 April 2010 – paras 204, 205.

²³ Directive 2000/60/EC of the European Parliament and the Council of 23 October 2000, establishing a framework for Community action in the field of water policy, OJ 2000, L 327, 22.12.2000, p. 1, Article 4(5).

authorized if there are no alternative solutions, or, in the absence of alternatives, the adverse effect is outweighed by an overriding public interest.²⁴

- Concerning industrial installations, wherever the law requires best available techniques this entails the consideration of alternative technologies not entailing excessive cost.²⁵

In addition to EU law and its transformation into Member State (MS) law examples of alternatives assessment can also be found in genuine MS law not (fully) determined by EU law. This is notably true for land use planning and the development of infrastructure, such as highways, etc. For instance, in Germany the planning tools – spatial plans (*Raumordnungspläne*), zoning plans (*Bebauungspläne*) and project development approvals (*Planfeststellungen*) – are all subject to the requirement of considering alternatives to the envisaged land uses. Even though the pertinent laws do not expressly require this, court jurisprudence has determined that the consideration of alternatives is a core element of the principle of fairly balancing all interests affected by a plan or project.²⁶ This is even required if the plan or project is not listed as requiring an EIA.²⁷

A further version of alternatives assessment can be found in the so-called encroachment regime (*Eingriffsregelung*) in German nature protection law. The concept is applicable to any significant alteration of nature and landscape. It establishes an entire cascade of checking including the consideration of alternatives, albeit of a rather narrow scope:²⁸ firstly, whether any adverse effects of the project can be avoided has to be assessed. Here, project variants are sought that intrude less into nature. The project *in toto* can however not be put into question at this stage, and the scope of alternatives is confined to those at the same location. As a second step, the adverse effects found unavoidable must be compensated either by remediation near the spot (*Ausgleichsmaßnahme*) or by restitution, possibly further away (*Ersatzmaßnahme*). As a third step the remaining damage must be weighed against the importance of the project; if it weighs heavier than the project, the latter is not permissible. If it is less grave, some compensation in cash must be paid.

VI.18.2.6 Alternatives in view of their function

Alternatives must be capable of fulfilling the function of the primary (existing or planned) variant. This can be deduced from legal formulations such as that the alternative must be 'suitable'. Absent such formulations it can be regarded as being implicit in the terms of an alternative.

²⁴ Directive 1992/43/EEC of the Council of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, OJ 1992, L 206, 22.7.1992, p. 7, Article 6(4).

²⁵ Directive 2010/75 (n 3, above), Article 2 No. 12.

²⁶ See e.g. BVerwG, decision of 30 May 1984 – 4 C 58.81, BVerwGE 69, 256 (273); decision of 20 December 1988 – 7 NB 2.88, BVerwGE 81, 128 (136).

²⁷ US law does not seem to require this. See as an example the Massachusetts regulation of road construction. General Laws Part I (Administration of the Government) Title XIV (Public Ways and Works) Section 4 and 5 outlines the procedure of planning new ways without any mention of the test of alternatives. <https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXIV/Chapter81/Section4> (accessed 18.01.2017).

²⁸ § 15BNatSchG (Federal Nature Conservation Act).

The function is often not easy to determine. One substance may, for instance, have three functions and the alternatives only one or two of the same. Would that disqualify them, or should 'alternative' mean not a single substance but another solution to the three functions, including a plurality of substances or different techniques? It is submitted that this is meant if Article 60(4) REACH Regulation refers to 'alternative substances or technologies'.

In nature protection law, partial functions have been seen, according to German jurisprudence, as excluding entire alternatives from assessment:

A planning variant which cannot be realized without the sacrifice of an independent partial aim of the project does, however, not have to be taken into account.²⁹

In that line, if a planned road serves both local and national/international transportation, while an alternative route which causes less environmental damage serves national/international, but not local transportation, this variant cannot be considered as an alternative. However, I believe this is a too narrow conception, because it may be that the local needs can be satisfied by other means than the alternative route.

The same problem is known in product-related law. Consider an example: ZF Luftfahrttechnik GmbH applied for the authorization of the carcinogenic and reprotoxic substance sodium dichromate for surface treatment of certain metals. An analysis of the alternatives concluded that the potential alternatives 'do not support all the properties of chromate-based surface treatment systems, and their long-term performance can currently only be estimated. Decreased corrosion protection would necessitate shorter inspection intervals, with a substantial impact on associated maintenance costs'.³⁰ It appears that the target of support for *all* properties is over-demanding, and the concern for a *substantial* impact on maintenance cost not very ambitious.

VI.18.2.7 The choice of alternatives

The selection of alternatives can be left subjectively to the developer or it can follow from objective criteria. Where an objective criterion is provided, usually the (private or public) interest in the use of nature serves as criterion for the decision about which project variants have to be considered. The subjective and objective concept will be illustrated by recent developments in EU legislation on EIAs and SEAs.

According to the earlier versions of Article 5 of Directive 2011/92/EC, 'an outline of the main alternatives studied by the developer' was to be submitted. The choice of whether alternatives are considered at all and, in the affirmative case, what kinds of alternatives are considered, was clearly left to the developer.

In contrast, Article 1 of the SEA Directive 2001/42/EC introduced an objective criterion by asking for 'reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme'. This implies that the planning authority is not free to decide, what alternatives, if any all, shall be assessed.

Such an objective criterion, reading 'reasonable alternatives relevant to the proposed

²⁹ BVerwG, decision of 17 January 2007 – 9 A 20.05, BVerwGE 128, 1 (66).

³⁰ European Chemicals Agency, Analysis of alternatives, <https://echa.europa.eu/documents/10162/9539e32a-998d-47c9-8c39-1652c0c2dd96> (accessed 4.12.2016).

project', was also suggested for inclusion into Article 5 of Directive 2011/92/EC by the Commission proposal of 2012.³¹ It was even heralded as one of two major steps forward towards strengthening the EIA.³² But the Commission's enthusiasm, which was also supported by the European Parliament,³³ was cooled down in the subsequent legislative procedure, which resulted in the enigmatic compromise that 'the reasonable alternatives studied by the developer' must be described.

If read literally, two requirements are now applicable: the alternatives must have been studied by the developer and they must be reasonable. This means that reasonable alternatives need not be assessed if they were not studied by the developer. Inversely, alternatives studied need not be described if they are not reasonable. The reasonableness criterion would thus restrict the assessment of alternatives even more than before. It is obvious that such a reading would pervert the initial intention of strengthening alternatives assessment. Having this intention in mind, a teleological interpretation could be attempted, with the effect that the reasonable alternatives must be studied by the developer and subsequently described. Imagine, as an example, that the developer bluntly refuses to study one obviously and highly reasonable alternative: should this be disregarded by the competent authority? Unfortunately, however, the text cannot be set aside and the cumulation of the two requirements must be accepted. In practice, its restrictive effect can be somewhat mitigated if the authority examines the studies of the developer. The authority could also refer to the fact that according to the new formulation of Article 5 of Directive 2011/92/EC not only an 'outline' but a 'description' of the alternative must be submitted. If, for instance, the developer had previously consulted other authorities or third persons about alternative sites of the project, they could serve as witnesses that such a study was undertaken. The right of access to information could help to reveal this to interveners defending environmental interests. For the rest, studies of alternatives are accessible anyway, if the developer is a public authority.

Moreover, it should be kept in mind that sectoral laws may set higher standards. A clear example is the Natura 2000 regime, where the study of alternative solutions is an objective obligation. Other examples can be found in Member State law, such as in the German legal regime for infrastructure projects. Those projects are subject to a special authorization called *Planfeststellung* (plan approval) which presupposes that all interests affected by the project *and* by any reasonable alternatives must be identified and fairly weighed up, including the weighing up of environmental protection interests.

VI.18.2.8 *The range of alternatives*

The range of alternatives that are to be considered may be narrow or broad. The only reasonable criterion of range appears to be the objective of the activity. In order to identify the objective, a distinction has first to be made between the immediate objective of the project and a more general objective to which the project as well as other projects

³¹ Proposal for a Directive of the European Parliament and of the Council amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, COM(2012) 628 No. 5.

³² COM(2012) 628, p. 4.

³³ European Parliament, Position of 12 March 2014, PT_TA (2013)0413, amendment 24. See, however, amendment 56 signalling the narrow formulation which was subsequently agreed.

may be instrumental. It is obvious that the broader the definition of the objective, the broader the scope of alternatives will be.

The difference shall be illustrated by the case of the river Weser in Germany. It is planned that the outer and lower Weser shall be deepened in order to allow larger vessels to reach the outer Weser port of Bremerhaven and the lower Weser ports of Brake and Bremen. The dredging would deteriorate the quality of the water. This would, as maintained by the ECJ,³⁴ be against Article 4(1) of the EU Water Framework Directive and could therefore not be authorized. Exceptionally, however, the authorization can be provided under Article 5(5) if, *inter alia*, ‘the environmental and socioeconomic needs served by such human activity cannot be achieved by other means, which are a significantly better environmental option not entailing disproportionate costs’. The immediate project purpose would be that large vessels shall be enabled to reach the ports, the more general goal being to strengthen the ports as a significant regional and international infrastructure as well as a regional engine of employment. Of course, in the first case there is no alternative to the dredging of the Weser, while there might be alternatives in the latter case.

Case law and prevailing scholarly opinion in Germany take the immediate project aim as standard. Accordingly, a judgment of the Federal Administrative Court (BVerwG) concerning the airport Münster/Osnabrück stated

‘One cannot still talk of an alternative if it leads to another project, since the legitimate objectives of the project developer cannot be achieved anymore’.³⁵

Against this interpretation, it may be objected that Article 5(5) of the Water Framework Directive requires a weighing up of variants with ‘socio-economic needs’. These more general objectives could as well be solved by further alternatives than those serving the immediate project purpose. In the Weser case this would mean that a close-by harbor offering deep water, the port of Wilhelmshaven, can be considered as a suitable alternative because, by cooperating with the Weser harbors, it would as well support the overall regional development.

A similar case concerns the deep dredging of the river Elbe. The BVerwG took the transportation capacity of the harbour of Hamburg as being the project aim. On that basis the court could determine the possibility for vessels to download in the port of Wilhelmshaven as being a project outside the project aim,³⁶ although that possibility could have figured as alternative within the project aim if the latter had more generally been defined as improvement of the transport capacity of all Northern German ports.

Against the concept that the scope of alternatives should include other projects, it could be argued that the testing of other projects should better be treated at a higher level of planning. In general, this is convincing. But it may be that no higher level of planning is provided for. For instance, for the planning of ports no higher level of planning

³⁴ ECJ Case C-461/13 of 1 July 2015 (Bund für Umwelt und Naturschutz), ECLI:EU:C:2015:433, paras 51 and 70.

³⁵ BVerwG, decision of 9 July 2009 – 4 C 12.07, BVerwGE 134, 166 (185); consistent line of decisions since BVerwG, decision of 19 May 1998 – 4 A 9.97 (A 20), BVerwGE 107, 1 (14).

³⁶ BVerwG, decision of 9 February 2017 – 7 A 2.15, BVerwGE 158, 1 (57, 65).

exists in Germany. Although the German Federal Transport Network Plan considers the extension of Federal waterways,³⁷ it does not discuss the issues preceding the extension, namely what functions the different ports are meant to have and how a division of functions could be established. If a higher-level planning existed that considers and determines alternatives, one could think of a binding effect of the higher-level planning (*Abschichtungswirkung*) on the lower level. But as long as a comprehensive plan for the extension and functions of ports is lacking, there is no other option than to include other projects as alternatives.

Transborder alternatives are a further question of scope. In the Weser case, given the project alternative of a cooperation of German ports as suggested above, one could think about also integrating the ports of Rotterdam and Antwerp, and hence the entire so-called North Range of seaports. It is questionable whether such a dimension of transnational alternatives is required by the Water Framework Directive. The same question could be posed in cases triggering the exception regime under Article 6(4) Habitats Directive. The issue is of significance also for the construction of roads, since it is imaginable that a motorway in the proximity of a national border could be built on the other side of the border in order not to affect a Natura 2000 site. Given that Natura 2000 is itself a transborder network, it appears obvious that those variants that harm the network should have a transborder aspect as well. Such a reading runs counter to the traditional policy in infrastructure construction, according to which each individual Member State maximizes its infrastructure in order to become economically more attractive than the neighboring State. From the point of view of the Habitats Directive, one could say that this policy becomes unacceptable once Natura 2000 sites are harmed. An analogical reasoning is possible concerning exceptions under Article 5(5) of the Water Framework Directive, since the overall approach of that directive is based on catchment areas which may reach across borders.

VI.18.2.9 Weighing up alternatives with economic and technical concerns

The existence of an ecologically preferable alternative hardly ever triggers the substitution of existing activities or inhibition of new activities per se. The assessment shall normally also look at other concerns, and most often economic and technical ones. The law uses different formulas to express this, such as that the alternative must be 'economically and technically feasible' or should not be 'entailing disproportionate cost'. Even if such concerns are not explicitly mentioned in the pertinent law they are sometimes seen to be implicit by relevant court jurisprudence.³⁸

'Technically feasible' points to the state of the art and excludes mere theoretical concepts. 'Best available technology' would refer to the most advanced technology that is applied in practice. 'Economically feasible' would require an assessment of an alternative in terms of the costs of its realization. If the alternative is excessively costly in comparison with the primarily proposed variant, this is an acceptable reason to reject it.

³⁷ Federal Transport Network Plan 2003, sec. 7.4. Available from http://www.bmvbs.de/Anlage/original_15944/Bundesverkehrswege-plan-2003-Beschluss-der-Bundesregierung-vom-02.-Juli-2003.pdf (accessed 24 July 2010).

³⁸ See for alternatives to projects having adverse effects on Natura 2000 areas BVerwG, decision of 17 January 2007 – 9 A 20.05, BVerwGE 128, 1 (66).

VI.18.2.10 Weighing up environmental risks with socio-economic benefits

While the project objectives should be considered as guiding the scope of alternatives, the objectives themselves are not subject to scrutiny in common legislation. As is common ground in liberal societies, the individual is free to choose his/her objective of action for him/herself.

However, when the environmental risk caused by an activity is significant, the law may require that the risk shall be weighed up with its objective. Then, the objective is not taken for granted but must be motivated, or, in other words, must constitute a socio-economic benefit. For instance, according to Article 60 of the EU REACH Regulation the authorization of SVHC may only be given if the ‘socio-economic benefits outweigh the risk to human health or the environment arising from the use of the substance and if there are no suitable alternative substances or technologies’. The assessment of alternatives is also affected by this balancing, because when an alternative scores better or worse than the primary variant, this will be an argument for or against the alternative.

The benefits in the cited Article 60 EU REACH Regulation may be those that relate to the private sector, for example that the products satisfy consumer needs, create jobs and generate profit for the producer. Other sectoral legislation raises the level of ambition by demanding that the benefits must be in the public interest. For instance, an overriding public interest in the impairing activity has to exist in the Natura 2000 regime for it to be allowable. The reason for this high burden of outweighing environmental risks is the particular sacrifice that the project demands: the harming of extremely valuable species and habitats. The interest concerned must first of all be a public one, which however is sometimes difficult to differentiate from private interests, since private interests may coincide with public interests.³⁹ Examples of clear cases are not hard to find. For instance, coastal protection against storm flooding is clearly a public interest, while the construction of a private marina is clearly a private one. In the grey area between these two extremes, additional criteria are helpful: the private generation of profit becomes a ‘public’ interest when it generates a relevant number of jobs, but not when a widely automatized facility is concerned (like the landing of gas), which at best serves fiscal interests.

There is concern about whether the introduction of risk-benefit weighing entails a clandestine devaluation of environmental protection. The fact that cost-benefit analysis was introduced in the times of neo-liberal ‘Reaganomics’ as a requirement for any regulation would support such a concern.⁴⁰ On the other hand, as risk-benefit considerations often occur under disguise, bringing them into an official calculus might lead to a clear and solid justification.

There may be reasons for differentiation between situations where such weighing is appropriate and where it is not. In a first case, when the possible damage is serious and cannot be made good – for instance because of serious harm to human health or to representative specimens of a species threatened by extinction – any weighing with socio-economic benefits should be excluded. In a second case, when the adverse effect

³⁹ For the practice of the Commission in the classification of public interests, see Krämer (2009) 82, who has critical remarks on the ease with which the Commission defines socio-economic interests as public, imperative and overriding.

⁴⁰ Ashford (2007) 352–378.

can indeed be made good – such as in cases of the sealing of natural surfaces – the adverse effect may be weighed up with the envisaged benefit. In a third case, where the likelihood of the adverse effect is uncertain but if occurring cannot be corrected or made good – such as in case of the release of genetically modified insecticide plants that have wild relatives – the risk, even if minimal, should be disallowed unless it entails a benefit (such as in the GMO example the reduction in the use of insecticides or pesticides).⁴¹

A further problem of the weighing of interests is that the socio-economic and environmental interests lack a common denominator: how should one, for instance, weigh the destruction of a biotope against the loss of employment? The problem is exacerbated when the weighing is to be done in monetary terms. Fortunately, none of the mentioned legal applications of balancing requires this, and wisely so, because hitherto economists have not been able to come up with valid methods of monetizing intangible goods.⁴² Practical decision-making is entitled to use qualitative criteria.

VI.18.2.11 Substitution/alternatives and compensation measures

The German encroachment regime is illustrative of the relationship between substitution and compensation of environmental deterioration. If for some legitimate reason substitution (or reference to an alternative) is not required, there can still be an obligation to take compensatory measures. This is also provided by Article 6(4) Habitat Directive where it is said that if an activity harming a Natura 2000 site is found to be justified by an overriding public interest, and no alternative solution is available, compensatory measures must nevertheless be taken in order to preserve the overall coherence of the Natura 2000 network.

A similar requirement can be found in US nature protection law. As an upcoming instance, Bill SD.389 of the Massachusetts General Laws provides that a public owner of land dedicated for nature conservation purposes (so-called Article 97 land) may only change its use if providing for replacement land.⁴³

It is a matter of concern that the compensatory measure may already be counted as reducing the environmental impact of the primary variant. This should be avoided. Compensation should only be considered once the primary variant as such has been proven to prevail over environmental concerns. This has been established by CJEU jurisprudence in relation to the Natura 2000 regime. The court ruled that compensation measures neither count as preservation measures under Article 6(2) Habitat Directive, nor as measures preventing harm under Article 6(3), but as measures that attenuate the harm after it has been found that the public interest overrides the harm.⁴⁴

⁴¹ Thus, a minimal residual risk by GMOs to certain parts of the environment could become acceptable if the overall environmental performance of agriculture were improved (Winter 2008, 211).

⁴² See further Ackerman and Heinzerling (2004).

⁴³ <https://malegislature.gov/Bills/190/SD389> (18.01.2017). The Bill does however not establish criteria on whether the land use change should be allowed at all.

⁴⁴ ECJ Case C-521/12, judgment of 15.05.2014 (Briels), ECLI:EU:C:2014:330, para. 29. It might be disputed whether the compensation measure must also be disregarded in the weighing

VI.18.3 Substitution/alternatives testing in a theoretical perspective

Putting the bits and pieces of substitution/alternatives testing together, one may ask if the concept has attained the status of a general principle in EU law, and if it has a consistent content.

VI.18.3.1 A principle?

If we mean by ‘principle’ the core idea of a given legal act or set of legal acts, one can certainly argue that there are EU (and US) legal acts that have indeed adopted the basic idea of substitution/alternatives testing. The above analysis proves this abundantly. In this sense the ECJ has also accepted substitution as a principle. The Court refers to the directives on occupational health, but adds that the reference is ‘inter alia’, meaning that the principle may also appear in other legal areas, and notably in chemicals regulation, which was the object of the court’s ruling.⁴⁵ Substitution or rather alternatives testing is also a basic idea in water and nature protection law, when it comes to the authorization of projects that are in principle prohibited, but may under exceptional circumstances be permitted.

While substitution/alternatives testing can be found in sectoral laws, it is difficult to already conceive it as an overarching general principle. The frequency of its appearance in sectoral laws, however, makes it possible to speak of an emerging general principle (or general basic idea).

If we take ‘principle’ not narrowly as a proposition prescribed by law but more generally as a policy objective, substitution/alternatives testing may be expected to frequently appear in programmatic documents. However, this is rarely the case. A prominent example is the 6th EU Environment Action Programme, where substitution is proposed as an objective for chemicals regulation.⁴⁶ Ludwig Krämer suggests that it should be a principle which guides integrated product policy in general.⁴⁷ One might add, if alternatives testing is also included, substitution/alternatives testing should become a general principle for environmental policy at large.

VI.18.3.2 A principle of ecological proportionality?

Of course, much depends on the content of the principle. As we have seen, the checking of substitution/alternatives most often appears in relationship with the consideration of environmental risks caused by an activity on the one side and achievable socio-economic benefits on the other. In addition, compensation measures may be added as a last resort, if substitution/alternatives are not available or dismissed by weighing. Two different schemes, a modest and an ambitious one, may be distinguished.

The modest version would be structured as follows:

up of the harmful effect and the public interest. I believe the judgment must be understood in the affirmative.

⁴⁵ ECJ Case C-473/98 of 11 July 2000 (Kemikalieninspektionen) para. 47.

⁴⁶ Decision No. 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme, OJ L 242, 10.9.2002, pp. 1–15, Art. 7(1) 4th indent.

⁴⁷ Krämer (2015), para. 6.054.

- determine the objective of an activity utilizing the environment;
- identify alternatives for achieving the objective;
- select the alternative that is least harmful, but still leads to roughly achieving the objective;
- when a viable alternative does not exist, go ahead with the planned activity.

The ambitious version would require a justification of the objective and its weighing against the environmental impact, as caused by alternative activities, possibly entailing a duty of compensation in the case of prevailing socio-economic interests. This version would have the following structure:

- determine and justify the objective of an activity utilizing the environment (legitimacy);
- examine whether the activity is in accordance with the objective (effectiveness);
- identify alternatives that roughly satisfy the objective not at excessive cost and select the least harmful one (necessity);
- if the least harmful alternative still causes significant harm, weigh the environmental interest against the interest in the activity, the interest having to be a public one if the environmental harm is severe;
- if the socio-economic benefit is overriding, take compensatory measures.

This structure resembles the proportionality principle as applied to governmental action encroaching on individual rights. Also in that respect an objective is envisaged and alternatives are identified that have less harmful side effects. If they are not avoidable, the side effects are weighed against the objective. There is a difference in the concepts, though. The common proportionality principle relates to State action, demanding that policy objectives should be pursued by measures having least impact on individual rights. By contrast, the principle as suggested in the environmental context is addressed to the individual citizen or industry or public body demanding that the actors should pursue their objectives by activities that have least impact on the environment.

In order to distinguish the two concepts, one could name them sociological proportionality and ecological proportionality respectively. ‘Sociological’ would mean that the test is made in order to protect society from governmental encroachment, and ‘ecological’ that the test shall protect nature from human encroachment.⁴⁸

Table VI.18.1 Weighing up of environmental risks with socio-economic benefits as applied to different alternative solutions

	Environmental (net) harm	Socio-economic (net) benefits	Score
Alternative A	-3	+2	-1
Alternative B	-1	+1	0

⁴⁸ See further on the concept Winter (2013).

The weighing up of environmental risks with socio-economic benefits as applied to different alternative solutions can be illustrated by the matrix shown in Table VI.18.1. The numbers indicate, as an exemplary case, the construction of a highway. Alternative A represents a line dissecting a valuable natural habitat but providing expedient transportation; alternative B bypasses the habitat but causes more transportation time and construction cost. This means that a decision-maker may take various project alternatives into account, determine the ratio of environmental risks and socio-economic benefits, and select the one with the best ratio.

VI.18.4 Conclusion

Substitution/alternatives testing is an emerging principle of environmental law. It can be instrumental to identifying and promoting the best environmental options of activities that potentially have adverse environmental effects. Their success depends on how the proposition is formulated and whether it is given binding force. Strong versions push for searching for and realizing the least burdensome alternatives. Weak versions may at least play an exhortatory role. A proviso should however be added. If the availability of an alternative is made a precondition of action, a counterproductive effect must be envisaged, that is, that environmentally harmful activities are tolerated until an alternative has been developed. This can be avoided if a harmful activity remains prohibited even if no alternative is as yet available. After all, it should not be forgotten that prohibiting an individual activity because of its environmental impact and without any consideration of alternatives normally triggers the search for new ones. 'Negative' intervention by regulatory law which is frequently blamed for hindering innovation, has in fact often proved to be a stimulus for innovation. The prohibition may create a situation of necessity. And necessity is said to be the mother of invention.⁴⁹

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⁴⁹ The proverb is attributed to the ancient Greek poet Theokritos, see <http://www.gnomikologikon.gr/authquotes.php?auth=1044> (22.01.2016).