Large-scale Water-related Innovative Renewable Energy Projects and the Habitats and Birds Directives: Legal Issues and Solutions

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Abstract

This article discusses two legal issues that relate to the conflict between the interest of protecting habitats and species under the Habitats and Birds Directives, versus the interest of promoting the use of innovative water-related renewable energy, with regard to the quota in the Renewable Energy Directive. These legal issues are: *first,* ***the possible conflict between the protection rules of the Habitats and Birds Directive on the one hand and the Renewable Energy Directive on the other hand, and*** *second,* ***the lack of integration between the Renewable Energy Directive and the derogation clauses of the Habitats and Birds Directives. Tidal stream energy is used as a case study to show the practical relevance of the legal issues for the large-scale deployment of innovative water-related renewable energy techniques. The final sections discuss solutions to the legal issues. These are*** *first,* ***the application of adaptive management in combination with mitigation or phased deployment, in order to deal with uncertainty, and*** *second,* ***the introduction of detailed renewable energy plans per Member State in order to increase integration between the Habitats and Birds Directives and the Renewable Energy Directive. The final sections also discuss the applicability of the findings of this article to other innovative water-related renewable energy sources such as wave energy and salinity gradient energy (blue energy).***

I. Introduction

Since the introduction of the renewable energy directive (RED) in 2009, the Member States of the European Union are bound to mandatory renewable energy targets.[1] Under this directive Member States must encourage the production of energy from "all types of renewable sources"[2] in order to meet the renewable energy production targets for the year 2020 as set out in the directive. Apart from wind and solar energy, these also include sources that require innovative water-related techniques, such as tidal energy, wave energy, and salinity gradient energy (blue energy). According to the European Commission, such renewable energy techniques can play an important role with respect to energy security and reaching Europe's decarbonisation goals.[3] At the same time, there are fields of EU law that can get into conflict with the "producing more renewable energy"-objective. These fields of EU law include nature protection law, state aid law,[4] free movement law,[5] and water law.[6] This article discusses two legal issues related to the conflict between the interest of protecting habitats and species under the Habitats and Birds Directives, versus the interest of promoting the use of innovative renewable energy, which follows from the Renewable Energy Directive. Tidal stream energy is used as a case study as it is an innovative water-related renewable energy source that may in particular face legal issues related to the Habitats and Birds Directives,[7] especially when implemented on a large scale in the future. Moreover, tidal stream energy is the most mature innovative water-related renewable

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[1] For instance, in 2020 the share of energy use from renewable sources should be 14% in the Netherlands, 23% in France, and 15% in the UK. See Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources, OJ 2009 L140/16, annex I.

[2] Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources, OJ 2009 L140/16, articles 6 and 14.

[3] European Commission, Communication, *Blue Energy – Action needed to deliver on the potential of ocean energy in European seas and oceans by 2020 and beyond*, COM(2014) 8 final (20 January 2014), pp. 2–3. The Commission uses the term "ocean energy", which is somewhat confusing as some of the techniques that are covered by this term (tidal energy and salinity gradient energy in particular) can also be used in an in or on-shore configuration. This is further discussed in the next section.

[4] The relation between investment state aid and innovative renewable energy projects in EU law will be discussed in a future article of the author of this article.

[5] S. van Hees, "Ålands Vindkraft (C-573/12): Conflict tussen het vrij verkeer van goederen en de bevordering van duurzame energie" [Ålands Vindkraft (C-573/12): Conflict between the free movement of goods and the promotion of renewable energy], 5/6 *Nederlands Tijdschrift voor Energierecht*, 212 (2014).

[6] See S. van Hees, "Large-scale water-related innovative renewable energy projects and the Water Framework Directive – Legal issues and solutions", 14 *Journal for European Environmental & Planning Law* 313 (2017).

[7] Tidal stream energy may, however, also face legal issues related to the Water Framework Directive. See section 6, third paragraph, for further elaboration on this.

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energy technique that currently exists.[8] This article will not focus on tidal range energy.[9] The final sections of this article also discuss the applicability of the findings to other innovative water-related renewable energy sources such as wave energy and salinity gradient energy (blue energy).

The first legal issue discussed in this article is the existence of a possible conflict between the goal to protect habitats and species, and the goal to produce more water-related innovative renewable energy. This is a very interesting conflict as it concerns two opposing policy areas which are both contributing to the EU's sustainable development goals. It is likely that the goal to protect habitats and species will sometimes come into conflict with Member State's efforts to promote an increased production of renewable energy, as required by the Renewable Energy Directive. This may especially be the case when it concerns water-related energy forms – such as tidal energy – that may have a negative effect on fish, marine mammals, sand banks and birds. An additional issue in this regard is the scientific uncertainty that often exists with regard to the existence and scope of such negative environmental effects.

The second legal issue discussed in this article concerns the lack of integration between the Habitats and Birds Directives on the one hand and the Renewable Energy Directive on the other hand. This lack of integration is demonstrated most clearly by the Habitats and Birds Directives' derogation clause. These clauses offer the possibility to exempt certain projects that are of overriding public interest from the protection rules after a balancing act is carried out. There is however no actual integration between the derogation clauses and the Renewable Energy Directive (RED). Nor is there an obligation to apply these clauses in cases where a renewable energy project risks to cause a prohibited negative effect on protected habitats and species. Therefore, there is no guarantee that applications for the authorisation of renewable energy projects that are important for achieving the RED's goals will actually be weighed under the Habitats and Birds Directives. Nor is there a guarantee that a serious balancing of interests will take place.

These two legal issues are discussed in the following sections, followed by a section that discusses possible solutions to the issues. First, however, this article features a brief case study of the innovative water-related renewable energy form "tidal stream energy", which serves to illustrate the practical relevance of the two legal issues for future innovative renewable energy projects. Both a Dutch and a Scottish project are assessed.

II. Case Study: Tidal Stream Energy in the Netherlands and Scotland

Tidal energy uses the power that is produced by tidal ebb and flow currents. One technique to harvest tidal energy is by using tidal stream turbines.[10] Tidal stream technology harvests the energy from water streams that are moving due to the tides. Tidal stream turbines are usually installed at sites with high-speed currents, such as narrow straits, inlets,[11] or channels between islands.[12] The design of tidal stream turbines is similar to the design of wind turbines, but "due to the higher density of water the blades are smaller and turn more slowly than wind turbines".[13] This type of turbine will

[8] Tidal stream energy is positioned between Technology Readiness Level (TRL) 7 and 8, while wave energy and salinity gradient energy are positioned at TRLs 6 and 4 respectively. Therefore, there is more data available on tidal energy than on the other energy forms. See International Renewable Energy Agency (IRENA), *Ocean Energy – Technology Readiness, patents, deployment status and outlook* (2014), p. xi.

[9] There are two main types of tidal energy: tidal stream and tidal range energy. While this article will refer to tidal range energy at several occasions, it will focus on tidal stream energy. There are three main reasons for this choice. First, tidal range energy is based on conventional hydropower technology that may be very dangerous to marine animals, and it requires a barrage or a dam to be built that may disturb the local ecosystem. Hence, its ecological impacts are deemed to be more severe than those of tidal stream energy. See International Renewable Energy Agency (IRENA), *Tidal Energy – technology brief* (2014), p. 27. Therefore, the author of this article estimates that tidal range energy will be less desirable from a sustainable development point of view. Second, wave and tidal stream energy "are largely viewed to have the highest potential for significant commercial applications globally in the near to medium terms." See International Renewable Energy Agency (IRENA), *Ocean Energy – Technology Readiness, patents, deployment status and outlook* (2014), p. 9; and Ocean Energy Forum (2016), *Ocean Energy Strategic Roadmap 2016, building ocean energy for Europe*, p. 23. Third, in the EU there are many recent tidal stream projects, but few recent tidal range projects. There is one recent tidal range project in the UK, which is fully permitted. See Ocean Energy Forum (2016), *Ocean Energy Strategic Roadmap 2016, building ocean energy for Europe*, p. 20. Focusing on tidal stream allowed to compare a recent project in the Netherlands to a recent project in Scotland.

[10] Another tidal energy technique is "tidal range energy". Tidal range devices make use of the vertical difference in the water level between a high tide and a low tide. They usually do this by "trapping or impounding the sea water within a flooded basin behind a large tidal barrage before releasing it back to the sea via turbines." See http://www.alternative-energy-tutorials.com/tidal-energy/tidal-power.html.

[11] For instance: the *Oosterschelde tidal energy project* in the Netherlands, see: http://www.tocardo.com/Project/oosterschelde/.

[12] For instance: the *Pentland Firth tidal energy project* in Scotland, see: https://www.atlantisresourcesltd.com/projects/meygen/.

[13] International Renewable Energy Agency, *Tidal Energy – Technology Brief*, 2014, p. 11.

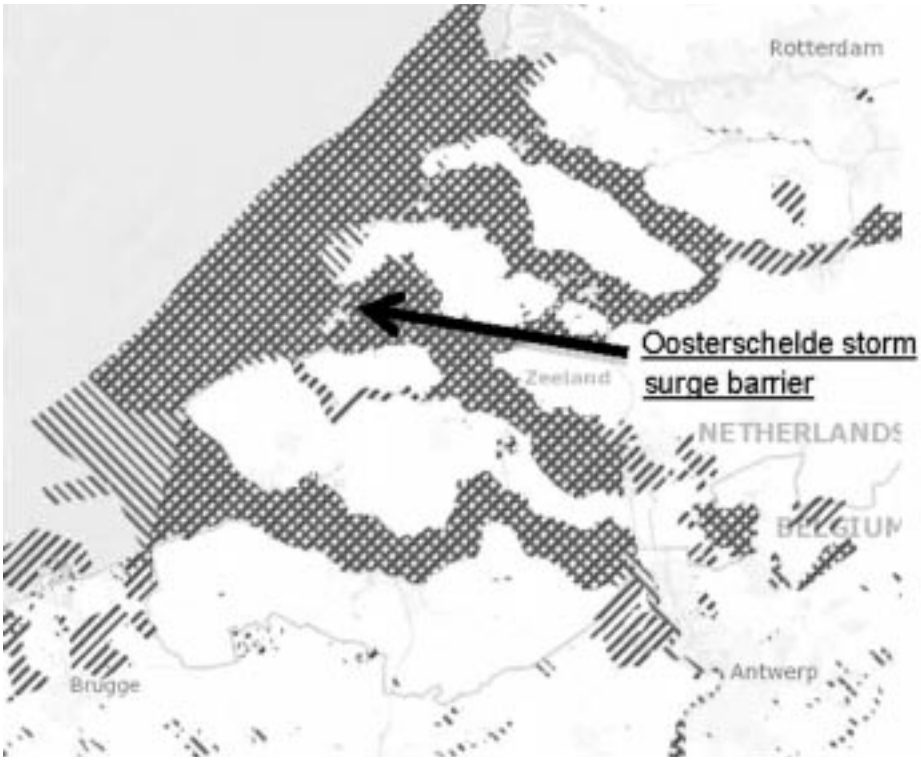

Figure 1. Oosterschelde (in the middle)
Source: EEA, Natura 2000 European protected areas – interactive map

normally be placed in barriers, under bridges or they can be fixed to the sea-bed.

Tidal stream energy is a relatively new technique. Currently there are only a few small-scale tidal stream developments in operation, including in the *Oosterschelde* and the *Afsluitdijk* storm surge barriers in the Netherlands, and in the *Pentland Firth* straight in the north of Scotland. Tidal energy has a predictable and often constant energy output, as opposed to wind and solar energy, which have a variable revenue. Therefore, tidal energy can help to achieve security of supply on the EU's renewable energy market. Moreover, it has the potential to produce a considerable percentage of the EU's renewable energy needs.[14]

Below two tidal energy pilot projects[15] are discussed to illustrate the possible conflict between tidal energy and the Birds and Habitats Directives. The Appropriate Assessments of both projects show that the negative environmental effects of these pilot projects were – in the present small-scale set-up – not found to be significant. Therefore the competent authorities authorised their construction. Nonetheless, the information gained from these small-scale pilot projects is relevant for this article as it suggests that tidal stream technology will possibly have significant negative effects on protected habitats and species if it is applied on a large scale in the future.

2.1. Tidal energy in the Oosterschelde (the Netherlands)
In 2015 the Dutch company Tocardo Tidal Turbines has installed a testing installation for tidal energy in one of the 62 openings of the Oosterschelde dam in the delta area of the province of Zeeland, in the south of the Netherlands. The installation consists of five two-bladed turbines which look like small upside-down wind turbines. The turbines are bi-directional, which means that they will harvest energy both from ebb and flow streams.[16] The Oosterschelde dam is a storm

[14] For instance, with respect to tidal energy in the UK: Marine Scotland, *MeyGen Decision, Decision Letter and Conditions*, http://www.gov.scot/Topics/marine/Licensing/marine/scoping/MeyGen/DecisionLetter, pp. 14 and 22: "Wave and tidal stream energy technology have the potential to play an important role in decarbonising our energy supply, increasing energy security and reducing our dependence on fossil fuels. The Carbon Trust has estimated that wave and tidal resources could provide 20 per cent of the UK's electricity if fully developed." [...] "Due to the intermittent nature of renewables generation, a balanced electricity mix is required to support security of supply requirements."

[15] The tidal energy projects in the *Oosterschelde* and the *Pentland Firth* have been selected to serve as examples as they are in a relatively developed phase, which means that there is some information available on their expected effects on protected habitats and species.

[16] IMARES, Institute for Marine Resources & Ecosystem Studies, *Passende Beoordeling van een getijdencentrale in de Oosterscheldekering* [Appropriate Assessment of a tidal energy plant in the Oosterschelde storm surge barrier], 27 April 2010, p. 6.

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surge barrier which has been built in order to protect the southern Netherlands from flooding by the North Sea. The doors of the dam are opened during normal weather conditions and will only be closed in the case of a storm. The dam separates the North Sea from an inland water body called ''the Oosterschelde'', which belongs to the estuaries of the Scheldt river. Both the Oosterschelde and the area just in front of the dam at the North Sea side are designated as Natura 2000 sites. The project is a commercial demo installation with a capacity of 1,2 MW. It will supply energy to an estimate of 2000 households. During the testing period, which lasts till 2030, measurements will be carried out to gather knowledge about the possible effects of the tidal turbines, such as effects on sea mammals and effects on tidal streams.[17]

The Appropriate Assessment of the project shows that the tidal energy turbines could have negative environmental effects on the Natura 2000 sites in and around the Oosterschelde water basin. The two main effects will be mentioned here.

First, the project could cause an increase of so-called ''sediment starvation''.[18] The installation of tidal turbines in two openings of the Oosterschelde dam is expected to cause a 14 per cent reduction of the tidal water flow per opening.[19] This decrease of water flow in the Oosterschelde water basin could result in a decrease of the difference between high and low water levels (amplitude), which will possibly cause increased erosion of sandbanks. These sandbanks are protected under the Habitats Directive, and are used by certain birds and by seals.[20]

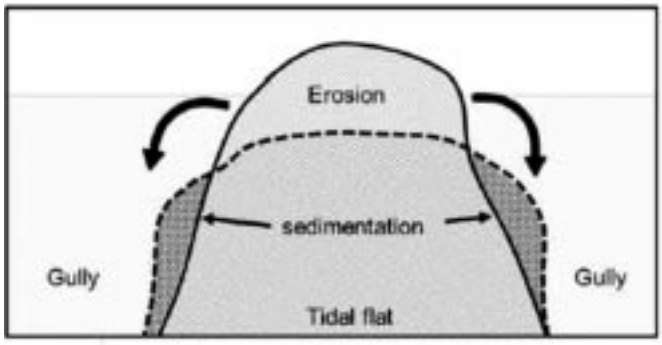

Figure 2. Sediment starvation: sediments that are eroding from the tidal flat end up being deposited in the gullies.

Source: Walles, B. (2015). *The role of ecosystem engineers in the ecomorphological development of intertidal habitats*. PhD thesis, Wageningen University, Wageningen.

Second, the project has a potential negative effect on seals,[21] harbour porpoises[22] and certain fish species. The harbour seal uses resting areas in the Oosterschelde and forages (searches for food) in the North Sea, which means that they need to pass the Oosterschelde dam.[23] Scientists assume that the harbour seal passes through the Oosterschelde dam on a regular basis. Also the harbour porpoise passes the dam. The Appropriate Assessment indicates that harbour seals, harbour porpoises and certain fish species are at risk of being hit by a rotor of a turbine. They could also decide to avoid the area of the tidal energy installation as they could be sensitive to underwater noise.[24]

2.2. Tidal energy in the Pentland Firth (Scotland)

MeyGen is a company that develops an offshore tidal turbine array in the body of water that separates the north of the Scottish mainland from Stroma Island.[25] The marked areas on the map represent the designated Natura 2000 sites in that area. The proposal would see an initial deployment of up to 61 fully submerged tidal turbines which are fixed to the seabed.[26] The turbines will be installed in stages with a final generating

[17] IMARES, Institute for Marine Resources & Ecosystem Studies, *Passende Beoordeling van een getijdencentrale in de Oosterscheldekering* [Appropriate Assessment of a tidal energy plant in the Oosterschelde storm surge barrier], 27 April 2010, p. 6.

[18] For further explanation of the ''sediment starvation''-effect see: B. Walles, *The role of ecosystem engineers in the ecomorphological development of intertidal habitats*, PhD Thesis (2015), p. 15, box 1.2, available at: www.researchgate.net.

[19] IMARES, Institute for Marine Resources & Ecosystem Studies, *Passende Beoordeling van een getijdencentrale in de Oosterscheldekering* [Appropriate Assessment of a tidal energy plant in the Oosterschelde storm surge barrier], 27 April 2010, p. 17.

[20] B. Walles, *The role of ecosystem engineers in the ecomorphological development of intertidal habitats*, PhD Thesis (2015), p. 14, available at: www.researchgate.net.

[21] The conservation objective for the harbour seal in the Oosterschelde is: ''Conservation of the size and improvement of the quality of the habitat for the benefit of an increase of the population in order to contribute to reaching a regional population of 200 animals at minimum in the delta area.''

[22] These animals are given specific protection under the rules on species protection of the Habitats Directive.

[23] IMARES, Institute for Marine Resources & Ecosystem Studies, *Passende Beoordeling van een getijdencentrale in de Oosterscheldekering* [Appropriate Assessment of a tidal energy plant in the Oosterschelde storm surge barrier], 27 April 2010, p. 10.

[24] According to the Appropriate Assessment the project also has a potential *positive* effect on seals as seals could benefit from changed water flow patterns caused by the turbines, because of which fish could become disorientated and could then be easier to catch. This could, however, have a potential negative effect on some fish species which are protected under the Habitats Directive.

[25] This water body is called the ''inner sound'' of the Pentland Firth.

[26] Marine Scotland, *MeyGen Decision, Decision Letter and Conditions*, http://www.gov.scot/Topics/marine/Licensing/marine/scoping/MeyGen/DecisionLetter, p. 25.

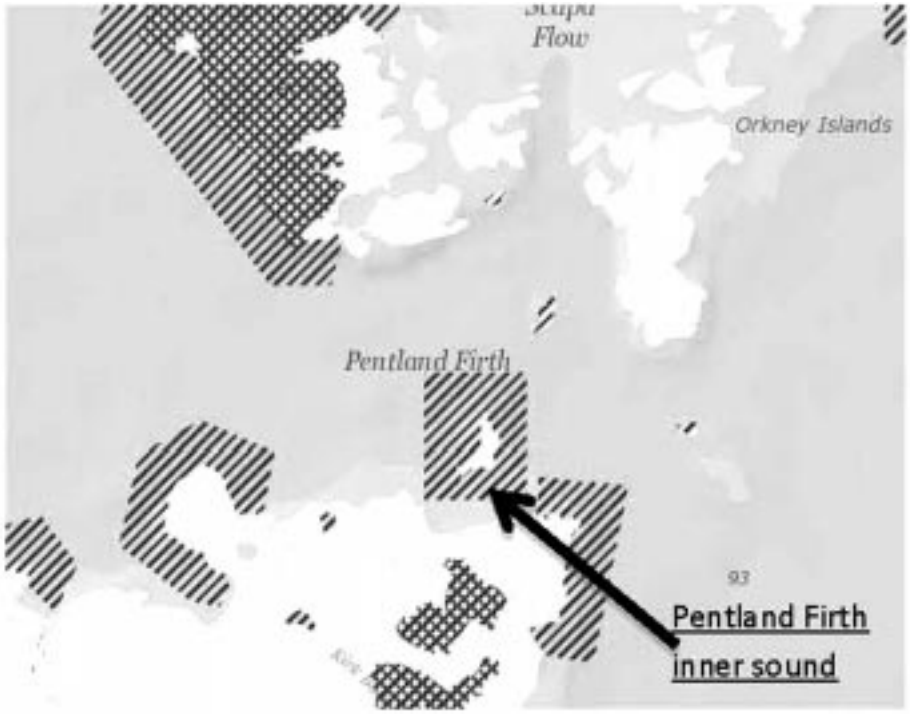

Figure 3. Pentland Firth inner sound
Source: EEA, Natura 2000 European protected areas – interactive map

capacity of 86 MW. The first phase of the Meygen Phase 1 development shall be restricted to 6 turbines. Monitoring will be required to inform decisions on future deployments and a further Appropriate Assessment will be required before further deployments are authorised to ensure that full consideration is given to any potential increase in environmental impacts.[27] This type of consenting is called "phased deployment" and is discussed as one of the solutions to the conflict between innovative renewable energy and the Habitats and Birds Directives in section 5.1.2. of this article.

The two main environmental effects of the Pentland Firth project are mentioned hereafter. First, the Appropriate Assessment shows that there may be displacement and a loss of foraging habitat for certain bird species due to the physical presence of the turbines, and also a potential for collision between birds and turbines. Furthermore, according to the initial assessment the Pentland Firth is considered to be one of the routes used by Atlantic salmon and sea lamprey migrating between freshwater and the open water. Potential impacts from the proposed tidal array on these species include: collision risks, noise (during installation, operation, maintenance and decommissioning) and effects on fish passage.[28] Second, according to the initial assessment there was no likely significant effect on nearby Natura 2000 sites designated for grey or harbour seals. The assessment does however state that as understanding of seal behaviour and movements improves, this conclusion might need reconsideration for future phases/turbine deployments. Moreover, in the Appropriate Assessment it is stated that "Due to potentially significant adverse impacts to other natural heritage features, namely the predicted collisions for harbour seals, an initial first phase deployment of 6 turbines is recommended, with a comprehensive post-construction monitoring programme to inform future phases."[29] In the final authorisation decision the Scottish Ministers noted that "Scottish Natural Heritage [SNH] and Whale and Dolphin Conservation considered the Company's Environmental Statement and concluded that there was the potential for significant adverse impacts to cetaceans such as the harbour porpoise and the minke whale due to increased vessel activity and collision risk with the turbines." However, with regard to the predicted avoidance rates by cetacean species SNH concluded that the 6-turbine development would not

[27] Marine Scotland, *MeyGen Decision – Appropriate Assessment*, http://www.gov.scot/Topics/marine/Licensing/marine/scoping/MeyGen/AppropriateAssessment, p. 77.
[28] The conservation objectives for all the aforementioned species include the objectives to avoid deterioration of habitats, to avoid significant disturbance, and to maintain the viability of the population within the site. See Marine Scotland, *MeyGen Decision – Appropriate Assessment*, http://www.gov.scot/Topics/marine/Licensing/marine/scoping/MeyGen/AppropriateAssessment, pp. 97–80.
[29] Marine Scotland, *MeyGen Decision – Appropriate Assessment*, http://www.gov.scot/Topics/marine/Licensing/marine/scoping/MeyGen/AppropriateAssessment, pp. 90–91.

have an adverse impact on the favourable conservation status of the population.[30]

2.3. Conclusion

As regards the above mentioned negative effects the Appropriate Assessments of both projects concluded that they will be very limited or not occur at all in relation to the present small scale projects. Scientific uncertainty about the exact scope of these effects does however remain and monitoring will be necessary to inform future projects or phases.[31] The habitats and species that feature in the case study are all covered by the protection rules of the Habitats and Birds Directive. The protection rules of these directives may cause problems for tidal energy projects if negative effects to those habitats and species occur on a sufficiently large scale. These effects are therefore expected to play an important role in the authorisation procedure of future large-scale tidal energy projects.

III. Legal issue I: Conflict between the Provisions of the Habitats and Birds Directives and the Renewable Energy Directive

The first legal issue is the existence of a potential conflict between the Habitats and Birds Directives' goal to protect habitats and species, and the goal to produce more water-related innovative renewable energy, with regard to the quota in the Renewable Energy Directive. The Habitats and Birds Directives may require rejection of certain projects due to their possible negative effects on protected habitats and species. At the same time, those projects may actually be necessary to achieve an increased production of renewable energy, as required by the Renewable Energy Directive. In this sense there is a potential conflict between the provisions of the Renewable Energy Directive and those of the Habitats and Birds Directives. This section discusses the protection rules of these environmental directives and assesses the extent to which projects such as large-scale tidal energy may be caught by them.

3.1. The rules for the protection of Natura 2000 sites

The nature sites which are designated as Natura 2000 sites[32] are subject to a strict protection regime, which gives effect to the important position of the precautionary principle in EU nature protection law.[33] According to Article 6(3) Habitats Directive and case law of the European Court of Justice, competent authorities may only agree to new projects when they are certain that those projects will not have "lasting adverse effects on the integrity" of the Natura 2000 sites in question, and "where no reasonable scientific doubt remains as to the absence of such effects".[34]

Whether such a lasting adverse effect on a site's integrity actually exists must be decided through an appropriate assessment,[35] which assesses the project's effects on the site "in view of the site's conservation objectives". These conservation objectives set targets for the habitats for which the site is designated as a Natura 2000 site.[36] The site's integrity will be adversely

[30] Marine Scotland, *MeyGen Decision, Decision Letter and Conditions*, http://www.gov.scot/Topics/marine/Licensing/marine/scoping/MeyGen/DecisionLetter, p. 19.

[31] IMARES, Institute for Marine Resources & Ecosystem Studies, *Passende Beoordeling van een getijdencentrale in de Oosterscheldekering* [Appropriate Assessment of a tidal energy plant in the Oosterschelde storm surge barrier], 27 April 2010, p. 45; Marine Scotland, *MeyGen Decision – Appropriate Assessment*, http://www.gov.scot/Topics/marine/Licensing/marine/scoping/MeyGen/AppropriateAssessment, pp. 90–92.

[32] The Natura 2000 network consists of two types of protected areas: so-called *special protection areas* (Birds Directive) and *special areas of conservation* (Habitats Directive). *Special protection areas* contain the habitats of certain endangered wild bird species, which are in need of special conservation measures. These measures have to ensure the survival and reproduction of the protected birds. *Special areas of conservation* contain natural habitat types (including tidal flats and estuaries) and the habitats of certain species other than birds (certain mammals, reptiles, fish and invertebrates), which have to be maintained or, where appropriate, restored to a favourable conservation status.

[33] According to the ECJ: "In this respect, it is clear that the authorisation criterion laid down in the second sentence of Article 6(3) of the Habitats Directive integrates the precautionary principle [...] and makes it possible effectively to prevent adverse effects on the integrity of protected sites as the result of the plans or projects being considered. A less stringent authorisation criterion than that in question could not as effectively ensure the fulfilment of the objective of site protection intended under that provision." See European Court of Justice, Case C–127/02 *Waddenvereniging and Vogelbeschermingsvereniging* [2004] ECR I–7405, para 58.

[34] European Court of Justice, Case C-258/11, *Sweetman,* para 40.

[35] An appropriate assessment is a detailed environmental assessment that has to be carried out for every project for which there is a "probability, or a risk" that it will have a "significant effect" on a protected Natura 2000 site. It needs to identify all aspects of the project which can, "by themselves or in combination with other plans or projects", affect the conservation objectives of the site concerned. These assessments should be carried out in the light of the best scientific knowledge in the field. See Article 6(3) of the Habitats Directive and European Court of Justice, Case C–127/02 *Waddenvereniging and Vogelbeschermingsvereniging* [2004] ECR I–7405, paras 43–44, 57 and 61, and European Court of Justice, Case C-258/11, *Sweetman,* para 40.

[36] A conservation objective can be described as "the specification of the overall target for the species and/or habitat types for which a site is designated in order for it to contribute to maintaining or reaching favourable conservation status of the habitats and species concerned, at the national, the biogeographical or the European level." See European Commission, *Commission note on setting conservation objectives for Natura 2000 sites*, final version 23

affected if the appropriate assessment shows that a project leads – or may lead – to a situation in which "the lasting preservation" of these habitats can no longer be guaranteed.[37] The conservation objectives provide information on the degree to which these habitats must be protected and must be consulted in order to know when a site's integrity will be adversely affected.[38]

The above explanation of Article 6(3) may have consequences for tidal energy projects as many of these projects will due to their nature be situated in, or close to, Natura 2000 sites. If one of the reasons for designating a site as a Natura 2000 site was – for instance – the presence of the habitat type "tidal flats"[39] then "the lasting preservation" of these flats must be guaranteed. If a tidal energy project will cause permanent damage to the tidal flats in that site, then the site is not kept at *a favourable conservation status* and there will be lasting adverse effects on the "integrity of the site".[40] The project will then in principle be forbidden. Apart from habitats, the Habitats Directive may also have implications for renewable energy projects that have negative effects on animals. For instance, the conservation objective for the harbour seal in the *Oosterschelde* Natura 2000 site is the "Conservation of the size and improvement of the quality of the habitat for the benefit of an increase of the population in order to contribute to reaching a regional population of 200 animals at minimum in the delta area."[41] Taking into account the preceding explanations of Article 6(3), this conservation objective implies that authorisation of a project is not allowed if it affects the seal's habitat that is present in the Natura 2000 site to such extent that the site is not suitable anymore for reaching and sustaining a population of 200 seals. This may occur when tidal turbines prevent – or risk to prevent – seals from reaching their protected habitats.[42] Hence, even though these animals are not granted specific protection under Article 12 of the Habitats Directive, they may still require protection in relation to their habitat due to the formulation of the relevant conservation objectives.[43]

The above shows that the Habitats Directive focuses on the long-term sustainability of protected habitats in Natura 2000 sites, rather than on preventing short-term and reversible negative effects.[44] If, however, this long-term sustainability is at risk, then project authorisation needs to be refused. The case law is strict in this regard and leaves no room for

cont.
November 2012, section 2. Note that the term "favourable conservation status" is used here in a "broad sense" (it concerns the achievement of a favourable conservation status of the habitats and species at "the national, the biogeographical or the European level", which is the ultimate goal of the directive), while the term is used in a "narrow sense" (only referring to the favourable conservation status of the Natura 2000 site in question) in relation to the question whether a site's integrity is affected (see footnote 37).

[37] According to the ECJ, in order for a site's integrity not to be adversely affected, the site must be preserved at *a favourable conservation status*. One can speak of a favourable conservation status of a Natura 2000 site when "the lasting preservation" is guaranteed of the "*constitutive characteristics of the site* concerned that are connected to the presence of a natural habitat type whose preservation was the objective justifying the designation of that site in the list of SCIs, in accordance with the directive." See European Court of Justice, Case C-258/11, *Sweetman,* paras 39 and 46.

[38] The importance of conservation objectives is emphasised by A.G. Sharpston, whose conclusion has been agreed to by the ECJ. According to the AG: "It follows that the constitutive characteristics of the site that will be relevant are those in respect of which the site was designated and their associated conservation objectives. Thus, in determining whether the integrity of the site is affected, the essential question the decision-maker must ask is 'why was *this particular site* designated and what are its conservation objectives?'." Conclusion of A.G. Sharpston, Case C-258/11, *Sweetman, para 56*.

[39] According to Article 3 Habitats Directive, the Natura 2000 network is "composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II" of that directive. Tidal flats are mentioned by Annex I of the Habitats Directive as "natural habitat types of community interest whose conservation requires the designation of special areas of conservation".

[40] Compare to the situation in Sweetman where the site's constitutive characteristics was the natural habitat type "limestone pavement", which would be permanently damaged by the project. See European Court of Justice, Case C-258/11, *Sweetman,* para 45.

[41] IMARES, Institute for Marine Resources & Ecosystem Studies, *Passende Beoordeling van een getijdencentrale in de Oosterscheldekering* [Appropriate Assessment of a tidal energy plant in the Oosterschelde storm surge barrier], 27 April 2010, p. 19.

[42] This could even be the case if the turbines are placed outside of the Natura 2000 site in question as Article 6(3)'s protection measures are also applicable to activities that take place outside the Natura 2000 sites, but which have a significant effect on those sites. See European Commission, *Managing Natura 2000 sites – The provisions of Article 6 of the "Habitats" Directive 92/43/EEC* (2000), p. 30.

[43] This is also shown by a recent ECJ case about the cooling water inlet of a coal-fired energy plant that would prevent migratory fish from reaching their breeding areas in a protected Natura 2000 site upstream. The conservation objectives of that site covered these species and therefore they were awarded protection from negative effects of the coal-fired plant. European Court of Justice, Case C 142/16, *European Commission v Germany* (Moorburg coal-fired plant), paras 6 and 34–38.

[44] Such effects could occur for instance during the construction phase of a renewable energy project. Nevertheless, if such activities (such as piling or drilling) would cause disturbance of species in the sense of the articles on species protection (see the following sections), then these activities could still be forbidden pursuant to those articles. C.f. Conclusion of Advocate General Sharpston in Case C-258/11, *Sweetman, para* 59.

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deviation, except when the derogation clause of Article 6(4) is applied. The prohibition to authorise projects that cause lasting negative effects to Natura 2000 sites also applies to situations where there is scientific uncertainty as to those effects. With respect to innovative renewable energy technologies it is often uncertain whether or not an effect on a nature site will occur at all or to what extent it will occur. Section 3.3 elaborates further on uncertainty with regard to the environmental effects of innovative renewable energy projects.

3.2. The rules for the protection of species

Article 12 of the Habitats Directive covers the protection rules for animals that are in need of strict protection, which includes the harbour porpoise (categorised under "Cetacea"), which is a species that is present in both the *Oosterschelde* and the *Pentland Firth* Natura 2000 sites. There is a generic obligation to protect these animals, irrespective of where their habitat is. The relevance of this article for tidal energy projects is that it prohibits the *deliberate* disturbance of species, particularly during the period of breeding, rearing, hibernation and migration[45] and that it prohibits the deterioration or destruction of breeding sites or resting places.[46] Article 16 of the Habitats Directive offers a possibility for derogating from Article 12 if all the conditions in that article are fulfilled.

The Birds Directive protects *all* species of naturally occurring birds in the wild state which are present in the European territory of the Member States. The relevance of the Birds Directive for tidal energy projects is that Article 5 prohibits the *deliberate* disturbance of birds, particularly during the period of breeding and rearing and the deliberate destruction of, or damage to, nests and eggs or removal of nests. Article 9 of the Birds Directive offers a possibility for derogating from Article 5 if all the conditions in that article are fulfilled.

Although the directives do not specify the meaning of the term *disturbance*, some guidance is given in a (non-binding) Commission Guidance where the Commission suggests that "any disturbing activity that affects the survival chances, the breeding success or the reproductive ability of a protected species or leads to a reduction in the occupied area should be regarded as a "disturbance" in the sense of Article 12."[47] Probably this interpretation also applies to "deliberate disturbances" in the sense of Article 5 Birds Directive. A large scale tidal energy project in the *Oosterschelde* may be regarded as "disturbance" as it could make it more difficult for harbour porpoises to cross the Oosterschelde dam. Moreover, animals may start avoiding the dam or may be hit by the turbines. As it is known that the animals also breed in the Oosterschelde, this may be a severe form of disturbance. Similar issues may apply to the Pentland Firth.

The Directive does not specify the meaning of *deliberate* disturbance, but the ECJ suggested in relation to the prohibition of "deliberate capture or killing" of species[48] that a "deliberate" action requires that the author of the act *intended* the capture or killing, or, at the very least, *accepted the possibility* of such capture or killing.[49] Most probably this interpretation of the term "deliberate" also applies to the prohibition of "deliberate disturbances" of both wild birds and species that are protected under Article 12 Habitats Directive. This has – in relation to Article 12 species – also been argued by an English Court of Appeal.[50] The prohibition of accepting the mere *possibility* that species will be disturbed, may require competent authorities to refuse projects of which the exact environmental effects are still uncertain. This is likely to apply to many innovative renewable energy projects. The next section elaborates further on uncertainty with regard to the environmental effects of innovative renewable energy projects.

3.3. Uncertainty

Innovative water-related renewable energy technologies such as tidal stream energy are relatively new technologies and relatively few projects have been realised so far. Therefore there is limited environmental monitoring data available. Moreover, as different project locations and different project scales have different characteristics, monitoring data on the environmental effects of one project may not automatically be transferable to another project.[51] For these reasons there still is a considerable lack of scientific knowledge on the nature and the extent of the environmental effects of innovative water-related renewable energy technologies. This is exemplified by the appropriate assessments of the *Oosterschelde* and *Pentland Firth* tidal energy projects.[52] These assessments refer to "potential" and "expected" environmental effects, and they indicate the need for post-construction monitoring in order to gain more

[45] Article 12(1)(b) Habitats Directive.
[46] Article 12(1)(d) Habitats Directive.
[47] European Commission, *Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC* (2007), para 39.
[48] Article 12(1)(a) Habitats Directive.
[49] European Court of Justice, Case C-221/04, *Commission v Spain,* paras 72–74.
[50] J. Lowther, "Determining the Meaning of "Disturbance" for European Protected Species – *R (Morge) v Hampshire County Council* [2011] UKSC 2, 23:2 *Journal of Environmental Law* 319, 323 (2011).
[51] G. Wright, "Environmental Impact Assessment to Support Marine Innovation: The "Rochdale Envelope" and "Deploy & Monitor" in the UK's Ocean Energy Industry", in B Vanheusden and L Squintani (eds.) *EU Environmental and Planning Law Aspects of Large-Scale Projects*, 191 (Intersentia 2016).
[52] See section 2.

knowledge on these environmental effects.[53] Such knowledge gaps get more problematic as the size of projects increases.[54]

As concluded in the former sections, both the Natura 2000 and the species protection regimes require that authorisation of renewable energy projects is refused if there is uncertainty as to their effects on protected habitats or species. As the existence of knowledge gaps in this regard is inherently linked to innovative renewable energy techniques, future large-scale water-related innovative renewable projects are likely to face refusal of project authorisation under Articles 6(3) and 12 Habitats Directive and Article 5 Birds Directive. Possible paths that could lead to evading such refusal are *mitigation* and using the *derogation clauses* of the Habitats and Birds Directives. These options are discussed in the following sections.

3.4. Mitigation

Mitigation measures can be described as ''measures aimed at minimising or even cancelling the negative impact of a plan or project''.[55] They are an integral part of the specifications of the project.[56] Mitigation measures prevent the occurrence of negative environmental effects that are prohibited under Articles 6(3) and 12 Habitats Directive and Article 5 Birds Directive. The idea is that it will not be necessary for a competent authority to refuse authorisation of a project if by means of mitigation measures and prior to implementation of a project all prohibited negative environmental effects – or uncertainty as to those effects – are taken away. Mitigation measures must be strictly distinguished from *compensation* measures.[57]

There are several examples of mitigation measures that are potentially effective at reducing the environmental risks of tidal stream energy projects. ''*Smart turbine-positioning*'' – locating the project away from the corridors which marine mammals are most likely to use for passage to their preferred resting areas – could be an effective mitigation measure if the monitoring data of pilot projects offer clear data on migration patterns and if turbine locations can be adapted accordingly.[58] However, in the case of large-scale projects there might be insufficient room for ''smart turbine-positioning''.[59] Moreover, monitoring data from small-scale projects may not give sufficient certainty to judge the effectiveness of the mitigation measure in large-scale projects. *Additional sand suppletion* on affected tidal flats could be a way to counter sediment starvation. However, taking the ECJ's judgement in *Briels* into account, ''habitat improvement measures'' – which include the creation of new foraging and resting areas, or improving existing ones, of which sand suppletion is an example – may be seen by the Court as a compensation measure, which cannot be taken into consideration under Article 6(3).[60] Nevertheless, there are also strong arguments in favour of qualifying sand suppletion as a mitigation measure.[61] Other techniques for countering sediment

[53] Marine Scotland, *MeyGen Decision – Appropriate Assessment*, September 2013, http://www.gov.scot/Topics/marine/Licensing/marine/scoping/MeyGen/AppropriateAssessment, for instance p. 90, and IMARES, Institute for Marine Resources & Ecosystem Studies, *Passende Beoordeling van een getijdencentrale in de Oosterscheldekering* [Appropriate Assessment of a tidal energy plant in the Oosterschelde storm surge barrier], 27 April 2010, for instance p. 48.

[54] G. Wright, *et al*., ''Establishing a legal research agenda for ocean energy'', 63 *Marine Policy* 126, 128 (2016).

[55] European Commission, *Managing Natura 2000 sites – Provisions of Article 6 of the ''Habitats'' Directive 92/43/CEE (2000)*, http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_en.pdf, pp. 36–37.

[56] The European Commission has mentioned some examples of mitigation measures, which include: adapting the dates and the timetable of implementation of a project (e.g., not to operate during the breeding season of a particular species), or specification of the type of tools and operation to be carried out (e.g., to use a specific dredge at a distance agreed upon from the shore in order not to affect a fragile habitat). See: European Commission, *Managing Natura 2000 sites – Provisions of Article 6 of the ''Habitats'' Directive 92/43/CEE (2000)*, http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_en.pdf, pp. 36–37.

[57] Mitigation measures guarantee that the project will not adversely affect the integrity of the site, while compensation measures compensate after the fact for any significant adverse effects on the protected habitats or species concerned. See European Court of Justice, Case C-521/12, *Briels*, para 31. Compensation measures can only be introduced under the derogation procedures of the Birds and Habitats Directives. See section 4.1.3. for further elaboration.

[58] ''Smart turbine-positioning'' has been done in the *Oosterschelde* pilot project and has been coupled with a programme to monitor if seals are suffering from rotor blade injuries. IMARES, Institute for Marine Resources & Ecosystem Studies, *Passende Beoordeling van een getijdencentrale in de Oosterscheldekering* [Appropriate Assessment of a tidal energy plant in the Oosterschelde storm surge barrier], 27 April 2010, p. 49.

[59] For instance in the case of a future large-scale project in the Oosterschelde –which would use a considerable percentage of the dam's openings– it might be difficult to keep all the turbines far away from resting areas.

[60] European Court of Justice, Case C-521/12, *Briels*, para 31. Moreover, the Orleans case shows that nature creation measures which are taken before the harm has been done, but which do not prevent the occurrence of such harm, must be qualified as compensation measures, see: European Court of Justice, Joined cases C-387/15 and C-388/15, *Orleans*, paras 55–58 and 64.

[61] It is conceivable that sand suppletion in the Oosterschelde *can* be qualified as a mitigation measure as it differs considerably from the measures taken in *Briels*. According to the Court, the creation of new meadows in the *Briels*-case was not aimed at avoiding or reducing the significant adverse effects on the protected and affected meadows, but they tended to compensate after the fact for those effects. However, sand suppletion in the Oosterschelde would prevent the negative effect – i.e. the erosion of tidal flats – from occurring at all. In that sense it is more logical to

starvation are *smoothening* the edges and the bottom of the storm surge barrier dam,[62] and *introducing oyster reefs* on tidal flats.[63] These techniques are however very new and their effectiveness is not yet proven. Finally, *fish barriers* are sometimes mentioned as an option for mitigating fish-turbine collisions. Such barriers are however problematic as they cause a loss of hydraulic power which is needed for energy production, and it is difficult to keep them clean.[64]

The above shows that there is uncertainty about the effectiveness, feasibility and – in the case of sand suppletion – the legality of mitigation measures for tidal energy projects. Moreover, mitigation measures can only be successful at preventing a refusal to grant project authorisation if they succeed at taking away the prohibited negative effects on habitats or species or any remaining uncertainty with regard to the occurrence of such effects. Even in the case that some of these – or other – mitigation measures turn out to be effective in small-scale projects it will be difficult to proof beforehand that they will also work in large-scale projects. The burden of proof for mitigation measures is high as the Birds and Habitats Directives require that uncertainty is taken away before projects are authorised. The ECJ's strict reasoning in the recent *Moorburg coal-fired plant* case is an example in this regard.[65] Mitigation measures will therefore normally not be an easy project-saver in the case of possible negative effects caused by new and innovative renewable energy techniques.

3.5 Conclusion

It is argued in this article that due to expected – certain or uncertain – negative environmental effects of future large-scale tidal energy projects, competent authority will often have to decide to refuse project authorisation under the Habitats and Birds Directives. It is expected that mitigation measures will not always be effective at preventing deteriorations or at taking away uncertainties. Moreover, some mitigation measures may not be feasible or not allowed. In that case only the derogation clauses of the Habitats and Birds Directives can be used to prevent project authorisation from being refused.

IV. Legal issue II: Lack of Integration between the Renewable Energy Directive and the Derogation Clauses of the Habitats and Birds Directives

Articles 6(4) and 16 Habitats Directive and article 9 Birds Directive contain derogation clauses that allow for the weighing of habitats and species protection against other interests. Their application could, if all conditions are fulfilled, lead to a renewable energy project's derogation from the protection rules of the Habitats and Birds Directives. There is however no actual integration between these derogation clauses and the Renewable Energy Directive (RED). Nor is there an obligation to apply the clauses in cases where a renewable energy project risks to cause prohibited negative effect on habitats or species. Therefore, there is no guarantee that applications for the authorisation of renewable energy projects that are important for achieving the RED's goals will actually be weighed under the Habitats and Birds Directives. Nor is there a guarantee that a serious balancing of interests will take place.

The following sections first discuss the scope of the derogation clauses, and secondly their lack of integration with the Renewable Energy Directive.

4.1. The derogation clauses

According to Article 6(4) Habitats Directive, Member States are not in breach of Article 6(3) if a project that

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qualify it as a mitigation measure. Compare this to a recent Dutch case which shows that mitigation measures can sometimes even consist of the construction of new foraging and resting areas for birds outside of the affected Natura 2000 site. According to the Court (the Council of State) the measure prevented the decrease of the population of protected birds and can therefore be seen as a mitigation measure. See Raad van State, ECLI:NL:RVS:2014:3884, Primaire waterkering Zwakke Schakels Noord-Holland (29-10-2014), para 24.4.3.1. For further discussion of this issue see R. Frins and H. Schoukens, "Balancing Wind Energy And Nature Protection: From Policy Conflicts Towards Genuine Sustainable Development?" in L. Squintani and H.H.B. Vedder (eds.), *Sustainable Energy United in Diversity*, 105–107 (EELF 2014).

[62] This approach has not yet been tested. See Provinciale Zeeuwse Courant, 'Pas bodemkering aan voor getijdenenergie' ["Adapt the bottom of the storm surge barrier for the benefit of tidal energy"], 1–3-2016.

[63] This will slow down erosion and preserve biodiversity. This technique was tested in the Oosterschelde but quantitative studies are still needed to prove their effectiveness. B. Walles, *The role of ecosystem engineers in the ecomorphological development of intertidal habitats*, PhD Thesis (2015), pp. 19 and 34–35, available at: www.researchgate.net.

[64] Based on an interview with Dr. ir. J. van Berkel, Professor of Sustainable Energy in Delta Areas at the HZ University of Applied Sciences in Vlissingen, the Netherlands. The interview transcript is available from the author.

[65] In this case a fish ladder was proposed as a mitigation measure for the cooling water inlet of a coal-fired energy plant that would prevent migratory fish from reaching their breeding areas in a protected Natura 2000 site upstream. It was concluded that the effectiveness of the measure could only be confirmed following several years of monitoring. The ECJ therefore concluded that the parties could not guarantee *beyond all reasonable doubt* that that plant would not adversely affect the integrity of the site. European Court of Justice, Case C 142/16, *European Commission v Germany* (Moorburg coal-fired plant), paras 34–38.

Conditions for the application of the derogation clauses

Article 6(4) Habitats Directive	Article 16 Habitats Directive	Article 9 Birds Directive
1) There are no **alternative solutions** 2) There are so-called **'imperative reasons of overriding public interest'**, making it necessary to carry out the plan or project 3) The Member State takes all **compensatory measures** necessary to ensure that the overall coherence of Natura 2000 is protected	1) there is no **satisfactory alternative** 2) a **favourable conservation status** of the species can be guaranteed 3) and furthermore, the derogation must have one of the reasons listed in Article 16, of which **'imperative reasons of overriding public interest'** (IROPI) is most relevant to tidal energy projects There is no explicit compensation requirement.	1) there is no **satisfactory alternative** 2) the derogation is for one of the reasons listed in the exhaustive list in Article 9, which includes **reasons for derogation like** 'it is in the interest of public health and safety', and 'for the protection of flora and fauna' There is no explicit compensation requirement.

has a prohibited negative effect on a Natura 2000 site must be carried out for ''imperative reasons of overriding public interest''. Similarly, Article 16 Habitats Directive says that Member States may derogate from the Article 12 rules on species protection if justified by imperative reasons of overriding public interest. And Article 9 Birds Directive offers a possibility to derogate from the obligations to protect wild birds – as laid down in Article 5 – in the interest of *inter alia* public health, safety or the protection of flora and fauna. All three derogation clauses mention several conditions that have to be fulfilled in order for the clauses to be applicable. These conditions are listed in Table 1 above.

The following sections discuss the conditions which are most relevant for tidal energy projects.

4.1.1. Alternative solutions

All three derogation articles require the competent authority to establish that there is no available alternative to the proposed project.[66] This is a decisive criterion for the applicability of the derogation articles. The competent authority must assess *all* alternatives,[67] and if it is of the opinion that a less harmful alternative exists which is suitable to achieve the aim of the project, then that alternative should be used. The competent authority has a considerable amount of discretionary power in this regard. The problem here is that one can differ of opinion about what in a certain situation must be considered as a suitable alternative for a specific tidal energy project.

It can be said that there are two possible interpretations. First, a suitable alternative could only consist of choosing a different location for the project that causes less harm to habitats or species. Second, a suitable alternative could also consist of choosing a different source of energy that causes less harm to habitats or species. The first interpretation is most preferable and would probably raise few problems for tidal energy projects. Tidal energy projects require very specific sites with high-speed currents, such as narrow straits, inlets (e.g. the *Oosterschelde*), or channels between islands (e.g. the *Pentland Firth*). These are scarce sites and in general it will be difficult to find suitable alternative locations, which would mean that the ''no-alternatives'' condition can be fulfilled relatively easily.[68] Opinions differ about the

[66] According to the ECJ this requirement must be interpreted strictly (in relation to Article 6(4), but this probably also applies to the other derogation articles). In the case *Commission v Portugal*, about the construction project of a motorway which would cross and negatively impact a Natura 2000 site, the Court ruled that it could not ''be ruled out immediately'' that the routes which fell outside of the protected site (although they would present certain difficulties) could qualify as alternative solutions. Accordingly, by failing to examine that type of solution, the Portuguese authorities did not comply with the requirement that the absence of alternative solutions should be demonstrated. See European Court of Justice, Case C-239/04 *Commission* v *Portugal* (Castro Verde), paras 25–40.

[67] According to the Advocate General an examination is required of *all* alternatives which would achieve the aim of the project but would affect the protected site less adversely or not at all. The decisive factor is – according to the AG – ''whether imperative reasons of overriding public interest require the implementation of specifically *that* alternative or whether they can also be satisfied by another alternative with less of an adverse effect on the protected site.'' See Opinion of Advocate General Kokott in Case C-239/04 *Commission* v *Portugal*, paras 42–46.

[68] Nonetheless, even if there is a suitable alternative site which has less impact on the environment, it may still be sensible not to use that alternative. The reason for that is that that there is a need for many renewable energy installations in order to reach the EU's 2020 quotas for renewable energy. This implies that a site which may seem a suitable alternative at first sight, may actually be needed for future renewable energy projects instead. This line of thought could make it a less suitable alternative after all. Moreover, a Dutch case on species protection suggests that even *if* there is an available alternative location, economic arguments could justify a choice for the originally proposed

second interpretation. It can be argued that the derogation articles do not require research into other energy sources than the one proposed.[69] But it can also be argued that they require competent authorities to look into other energy sources.[70] Interpreting the ''no alternatives'' condition such that it is required to look into the possibility to use different energy sources – such as wind or solar power – could potentially frustrate a Member State's renewable energy policy. In order to create a healthy energy mix Member States may actually need renewable energy sources which provide a continuous –base load– supply of energy, such as tidal energy. The author of this article therefore takes the position that it is better to interpret the derogation articles such that it is not required to consider alternatives that entail a completely different source of energy. While the sources referred to in this section mostly refer to the ''no alternatives'' condition in relation to Article 6(4) Habitats Directive, it is expected that these sources are equally applicable to articles 16 Habitats Directive and 9 Birds Directive.

4.1.2. Imperative reasons of overriding public interest

Articles 6(4) and 16 Habitats Directive require the existence of an imperative reason of overriding public interest (IROPI) that outweighs the site's conservation objectives which are at risk of being compromised by a project. Article 9 Birds Directive requires that the project in question relates to one of the reasons as mentioned in the exhaustive list in that article. Renewable energy projects will probably be eligible to qualify as an imperative reason of overriding public interest. The Habitats Directive does not specifically mention that ''renewable energy production'' can be an imperative reason of public interest. It does indicate that reasons related to ''beneficial consequences of primary importance for the environment'' may be raised. Water-related innovative forms of energy production can probably qualify as being beneficial for the environment as they are emission-free forms of energy production that can contribute to the EU-wide aim of reducing CO_2-emissions by 20 per cent in 2020. The highest Dutch administrative court also confirms the view that renewable energy can be an IROPI.[71] The ECJ has not yet ruled on a case that explicitly recognises renewable energy as an IROPI within the meaning of the Habitats and Birds Directives. However, it *has* confirmed that renewable energy can be an overriding public interest within the meaning of the Water Framework Directive in the *Schwarze Sulm* case.[72] In that case the Court referred *inter alia* to the high priority status that the promotion of renewable energy sources has within the European Union. A similar reasoning is likely to be successful in cases that concern the protection of habitats and species.

Article 9 of the Birds Directive contains an exhaustive list of reasons for derogation which does not include a reason that can automatically be linked to renewable energy production. Nevertheless, it is argued in the present article that the aforementioned arguments can also justify a derogation for renewable energy projects based on the Article 9 reasons ''public

cont.

site. In this case the Dutch Council of State decided that an alternative location for a wind park was not a *satisfactory* alternative because the costs for wind energy would be higher at that site (Raad van State, JM 2015/56 RvS, 18-02-2015, *201402971/1/A3*, ECLI:NL:RVS:2015:438, para 9.5). This economic argument played a role in the Court's decision alongside ecological arguments. The Court also found that from an ecological point of view none of the alternatives was better than the original site. According to the European Commission economic criteria cannot, however, be seen as *overruling* ecological criteria under the ''no-alternatives''-test (European Commission, *Guidance document on Article 6(4) of the ''Habitats Directive'' 92/43/EEC*, no 2007/2012, para 1.3.1). In view of the ECJ's ruling in *Commission v Portugal* this is indeed the correct approach.

[69] The UK's Department for Environment, Food & Rural Affairs (DEFRA) takes this view and states in its (not legally binding) Article 6(4) Guidance that ''alternative solutions are limited to those which would deliver the overall objective as the original proposal.'' It uses wind energy as an example and says that in the case of an offshore wind energy project, ''the competent authority would normally only need consider alternative offshore wind renewable energy developments. Alternative forms of energy generation (e.g. building a nuclear power station instead) are not alternative solutions to this project as they are beyond the scope of its objective''. See DEFRA, *Habitats and Wild Birds Directives: guidance on the application of article 6(4)* (2012), p. 3.

[70] R. Frins and H. Schoukens, ''Balancing Wind Energy And Nature Protection: From Policy Conflicts Towards Genuine Sustainable Development?'' in L. Squintani and H.H.B. Vedder (eds.), *Sustainable Energy United in Diversity – Challenges and approaches in energy transition in the EU*, 93 (EELF 2014).

[71] The highest Dutch administrative court confirms this view by stating that it cannot be said that the generation of renewable energy cannot be an imperative reason of overriding public interest (in the sense of the former Article 19g, second paragraph, of the Nature Conservancy Act 1998 (now Article 2.8, fourth paragraph, Nature Conservation Act), which is the Dutch implementation of article 6(4) of the Habitats Directive). The Dutch court underpins its statement by referring to the increasing need for sustainable energy and to the existence of national and international goals which aim to reduce the emission of greenhouse gasses. For the case, see: Raad van State, ECLI:NL:RVS:2009:BH4011 (Windturbines Emmapolder), para 2.16. A similar argument has been given by the Dutch court in relation to species protection in a case about protected bats that would be harmed by the construction of a small wind energy farm. See Raad van State, ECLI:NL:RVS:2015:438 (Windturbines Sabina Henricapolder), para 9.4.

[72] European Court of Justice, Case C-346/14, *Schwarze Sulm*, paras 71–74.

health'' and ''the protection of flora and fauna''. This argument is supported by the highest Dutch administrative court and by the European Commission.[73] This is a desirable approach, as otherwise the presence of wild birds at a development site could frustrate a project, even if the derogation clauses of the Habitats Directive are applicable.

Apart from establishing the existence of a valid reason for derogation, the derogation articles also require that a balancing act is carried out. According to the ECJ a project must be of such an importance ''that it can be weighed up against that directive's objective of the conservation of natural habitats and wild fauna and flora.''[74] Hence, not every individual renewable energy project will be of such importance that it outweighs the need to protect certain habitats and species. This is illustrated by a Dutch case about a permit for the construction of 17 wind turbines next to a Natura 2000 site. In that case the highest Dutch administrative court argued that while renewable energy *can* be qualified as an imperative reason of overriding public interest, this does not mean that *every* contribution to the generation of sustainable energy can be qualified as such. The Dutch Court ultimately concluded that the competent authority had failed to substantiate sufficiently why more weight must be given to the installation of 17 wind turbines at that specific site than to the relevant conservation objective.[75] By way of contrast, in another Dutch case the same court approved a 3-turbine wind energy project because the project contributed to the Dutch renewable energy objectives while having a relatively small impact on protected bat species.[76] These cases show that competent authorities must sufficiently substantiate the outcome of the balancing act. When competent authorities do sufficiently substantiate the outcome of the balancing act, they have a considerable amount of discretionary power. The reason for that is that the directives do not specify how the balancing act under the IROPI condition should be carried out. This aspect of policy discretion may cause problems for renewable energy projects, which are further discussed in section 4.2.

4.1.3. Compensation

Compensation is a compulsory condition of the derogation clause in Article 6(4) Habitats Directive. It is not an explicit requirement under Article 16 Habitats Directive and Article 9 Birds Directive. Compensation measures are meant to offset the negative effects of a project in order to guarantee that the ecological coherence of the Natura 2000 network is preserved.[77] Hence, the compensation requirement requires a very precise determination of the negative impacts of the project.[78] Compensatory measures differ from mitigation measures as they do not guarantee that the project will not adversely affect the integrity of the site within the meaning of Article 6(3) of the Habitats Directive. Instead, they tend to compensate after the harm has been done.[79]

In its guidance document on Article 6(4) the European Commission gives a couple of examples of specific measures that would qualify as compensation in the sense of Article 6(4). These include: the re-creation of a comparable habitat, the biological improvement of a substandard habitat within an existing designated site, and the addition to the Natura 2000 Network of a new site of comparable quality to the original site. According to the Commission compensation ratios should be well above 1:1. Ratios of 1:1 or below should only be considered when it is proved that the compensation measures will be 100 per cent effective in replacing the structure and function of the harmed habitat type within a short period of time.[80] Furthermore, compensatory measures must go

[73] The Dutch Council of State accepted the argument that climate change has effects on public safety, public health and flora and fauna, and that a windfarm could therefore be exempted under these reasons. See Raad van State, ECLI:NL:RVS:2016:1227, *Windcollectief Wieringermeer*, para 7.2. Moreover, in a guidance document the European Commission argued that public health and public safety might apply as reasons for a derogation for wind farms in the context of Article 9 of the Birds Directive and Article 16 of the Habitats Directive. See ''EU Guidance on wind energy development in accordance with the EU nature legislation'' (2011), p. 18.

[74] The European Court of Justice draws this conclusion from the term *imperative reasons of overriding public interest,* which must be both ''*public*'' and *''overriding''*. See Case European Court of Justice, C-182/10 Marie-Noëlle Solvay and others v Région Wallonne (16 February 2012), para 75.

[75] It must be noted that in this case the Court decided to include in its balancing exercise its conclusion that insufficient research has been done into suitable alternative sites. By doing that, the court in fact mixed the *alternative solutions* and the *reasons of overriding public interest* conditions. See Raad van State, ECLI:NL:RVS:2009:BH4011 (Windturbines Emmapolder), para 2.16.

[76] Moreover, the court was convinced that the chosen project is better than the available alternatives in terms of wind, cost-effectiveness and ecological impact. See Raad van State, ECLI:NL:RVS:2015:438 (Windturbines Sabina Henricapolder), paras 9.3–9.5.

[77] Geert Van Hoorick, ''Compensatory Measures in European Nature Conservation Law'', 10(2) *Utrecht Law Review* 161, 162 (2014).

[78] H. Schoukens and A. Cliquet, ''Mitigation and Compensation under EU Nature Conservation Law in the Flemish Region: Beyond the Deadlock for Development Projects?'', 10(2) *Utrecht Law Review* 194, 199 (2014).

[79] European Court of Justice, Case C-521/12, *Briels*, paras 30–31; The Orleans case shows that also nature creation measures which are taken before the harm has been done, but which do not prevent the occurrence of such harm, must be qualified as compensation measures, see: European Court of Justice, Joined cases C-387/15 and C-388/15, *Orleans*, paras 55–58 and 64.

[80] European Commission, *Guidance document on Article 6(4) of the ''Habitats Directive'' 92/43/EEC* (2007), pp. 17–18.

beyond the normal measures which are required for the protection and management of Natura 2000 sites.[81]

For large-scale tidal energy projects it will probably be difficult to comply with the compensation requirement. As literature points out, the lack of available and suitable sites which can be purchased within a short time is often a constraint for the implementation of compensation measures.[82] Moreover, tidal energy projects are typically located at sites which house a unique combination of tidal streams, and animals and habitats which are dependent thereon. It may be difficult to find a suitable location for compensation measures as such sites are often unique. Furthermore, ''no net loss of biodiversity'' is one of the principles of European nature protection policy,[83] and therefore the characteristics of compensation areas must probably also be very similar to the characteristics of the harmed nature site. This will make the task of finding a location even more difficult. This problem seems to be confirmed by the Commission's (non-binding) Guidance document which states that ''Compensation should refer to the site's conservation objectives [...] and to the habitats and species negatively affected in comparable proportions in terms of their numbers and status. At the same time the role played by the site concerned in relation to biogeographical distribution has to be adequately replaced.''[84]

According to the ECJ's *Briels* case, compensation measures cover any measure liable to protect the overall coherence of Natura 2000, whether it is implemented within the affected site or in another part of the Natura 2000 network.[85] In the case of future large-scale projects in the *Oosterschelde* and *Pentland Firth* one of the few possible solutions might therefore be to design the project in such a way that it affects only a part of the Natura 2000 site. Nature elements that will be lost in that part of the area might then be re-created in the part that has not been affected.

4.2. Lack of integration

Having discussed the most relevant conditions of the derogation clauses of the Habitats and Birds Directives, this section further elaborates on the lack of integration between those derogation clauses and the goals of the Renewable Energy Directive. This issue arises in relation to the *alternative solutions* condition and the *imperative reasons of overriding public interest* condition. The *compensation* condition will therefore be left aside for the moment.[86]

While the protection rules for habitats and species can form a barrier for innovative water-related renewable energy projects such as tidal energy, the Habitats and Birds Directives also offer the possibility for a derogation for such projects. The mere fact that there is a possibility to derogate from the objectives of these directives for the benefit of renewable energy shows that the concept of ''policy integration''[87] is embedded in both directives at least to some extent. Policy integration –which is one of the main aspects of sustainable development – requires the EU and its Member States to take all sustainability-related policy objectives into account in all the decisions that they take.[88] These policy objectives include the protection of habitats and species, but also the promotion of renewable energy production. Nevertheless, the mere existence of a procedure that allows for weighing various policy objectives does not as such guarantee that that procedure is also used in practice, nor does it guarantee that the weighing exercise is carried out in a manner that fits both in the environmental *and* in the renewable energy policy of the EU and the Member State in question. In other words, the existence of a procedure that embodies aspects of sustainable development, does not automatically lead to a sustainable outcome.[89]

[81] If, for instance, a new Natura 2000 area is designated which was already inventoried as ''of Community importance'', then this designation is a ''normal'' measure. Consequently, this area cannot simultaneously be used as compensation site under Article 6(4). See European Commission, *Guidance document on Article 6(4) of the ''Habitats Directive'' 92/43/EEC* (2007), p. 10.

[82] R. Frins & H. Schoukens, ''Balancing Wind Energy And Nature Protection: From Policy Conflicts Towards Genuine Sustainable Development?'' in L. Squintani and H.H.B. Vedder (eds.), *Sustainable Energy United in Diversity – Challenges and approaches in energy transition in the EU*, 100 (EELF 2014).

[83] Geert Van Hoorick, ''Compensatory Measures in European Nature Conservation Law'', 10(2) *Utrecht Law Review* 161, 165 (2014).

[84] European Commission, *Guidance document on Article 6(4) of the ''Habitats Directive'' 92/43/EEC* (2007), p. 12.

[85] European Court of Justice, Case C-521/12, *Briels*, para 38.

[86] In section 6 the position of the compensation condition is further elaborated on.

[87] In this article ''policy integration'' is defined in conformity with its definition within European Union law and policy, notably Articles 7 and 11 TFEU and the Renewed EU Sustainable Development Strategy. According to these sources the European Union ''*shall* ensure consistency between its policies and activities'' (Article 7 TFEU) and shall ''Promote integration of economic, social and environmental considerations so that they are coherent and mutually reinforce each other by making full use of instruments for better regulation, such as balanced impact assessment and stakeholder consultations.'' (the Renewed EU Sustainable Development Strategy). For further elaboration on policy integration see: S. van Hees, ''Sustainable Development in the EU: Redefining and Operationalizing the Concept'', 10(2) *Utrecht Law Review*, sections 2.1 and 2.3.1 (2014).

[88] S. van Hees, ''Sustainable Development in the EU: Redefining and Operationalizing the Concept'', 10(2) *Utrecht Law Review*, 60, 66–68 (2014)

[89] S. van Hees, ''Sustainable Development in the EU: Redefining and Operationalizing the Concept'', 10(2) *Utrecht Law Review*, 60, 76 (2014). A similar conclusion was drawn by the author of this article in relation to the

While it is possible to take renewable energy into account under the derogation clauses, these clauses do not specify *to what extent* renewable energy *can and should* be taken into account. It is also unclear what the importance of renewable energy is compared to the protection of habitats and species. By not specifying this, there remains a considerable amount of fragmentation[90] between the Habitats and Birds Directives and the Renewable Energy Directive. Whether or not integration will occur under the derogation clauses is completely dependent on the – sometimes decentralised – national authorities that are responsible for the enforcement of the Habitats and Birds Directives. As discussed before, these authorities have a considerable amount of policy discretion, especially when it comes to the appraisal of the availability of alternative solutions and the application of the balancing exercise under the *imperative reasons of overriding public interest* condition.[91] These authorities can decide to take renewable energy into account under the derogation clause, which happened in the Dutch cases discussed in the third paragraph of section 4.1.2. above. However, they can also decide not to do so, as there is no obligation to actually apply the derogation clauses in a specific case. This is illustrated by the ECJ case *Azienda Agro-Zootecnica Franchini* which concerned the refusal by the Italian competent authority to authorise the construction of a wind energy project in a Natura 2000 site. This decision was taken pursuant to a regional law providing for a total ban on wind turbines in Natura 2000 sites. In line with Article 193 TFEU[92] the ECJ concluded that the Habitats and Birds Directives do not forbid an absolute prohibition on the construction of wind turbines in Natura 2000 sites. The directives do not even require a competent authority to carry out a prior environmental assessment of the effects of the project on the site in question.[93] This specific case apart, in general it may be difficult for national authorities that have the enforcement of the Habitats and Birds Directives as their primary task, to take renewable energy into account at all times. These authorities could be tempted to focus on the protection of habitats and species. If a competent authority decides to refuse the authorisation of a future innovative water-related renewable energy project, this could be a very good decision from a case level perspective. The project's impact on protected habitats and species might in that specific case indeed seem to outweigh its contribution to renewable energy production. However, in order to achieve a fair balancing act, the role that a specific renewable energy project plays within the broader renewable energy strategy of the Member State in question should also be taken into account in that decision. The Habitats and Birds Directives do currently not guarantee that this will happen in practice.[94]

The following sections deal with the question how the two legal issues mentioned in this article can be dealt with.

V. Solutions to the Legal Issues: Dealing with Uncertainty and Towards Better Integration

The former sections of this article discussed two legal issues that relate to the conflict between the interest of

cont.
derogation clause of the Water Framework Directive. See in that regard: S. van Hees, ''Large-scale water-related innovative renewable energy projects and the Water Framework Directive – Legal issues and solutions'', 14 *Journal for European Environmental & Planning Law* 313, 334–336 (2017).

[90] In this article ''fragmentation of law'' is understood as a situation in which areas of law that are interrelated are in practice partially or fully dealt with in isolation. In relation to environmental and renewable energy policy both horizontal and vertical fragmentation can be distinguished. There is horizontal fragmentation, as the protection of habitats and species on the one hand and renewable energy on the other hand are dealt with in separate sectoral directives (multi-sector governance), and vertical fragmentation, as both policy areas are often dealt with by separate governmental bodies that are responsible for just one of the two policy areas (multi-level governance). For further analysis of fragmentation in EU law in relation to renewable energy, see: K. Van Hende, *Offshore Wind in the European Union – Towards Integrated Management of Our Marine Waters*, 68–69 and 77–78 (Wolters Kluwer 2015). For an overview of the history of the concept of fragmentation in legal literature, see: H. K. Gilissen, *et al*., ''Bridges over Troubled Waters: An Interdisciplinary Framework for Evaluating the Interconnectedness within Fragmented Flood Risk Management Systems'', 25(1) *Journal of Water Law* 12, 13–14 (2016).

[91] In this regard, also see: S. van Holten and M. van Rijswick, ''The consequences of a governance approach in European Environmental directives for flexibility, effectiveness and legitimacy'', in M Peeters and R Uylenburg (eds.) *EU environmental legislation – Legal perspectives on regulatory strategies*, 25–26 (Edward Elgar 2014).

[92] The Habitats Directive was adopted on the basis of Article 192 TFEU (the environmental legal basis), and Article 193 TFEU provides that Member States may adopt more stringent protective measures. With respect to the Birds Directive Article 14 of the Birds Directive provides that Member States may introduce stricter protective measures than those provided for under that directive. See European Court of Justice, Case C-2/10, *Azienda Agro-Zootecnica Franchini Sarl and Eolica di Altamura Srl v Regione Puglia*, paras 49–50.

[93] European Court of Justice, Case C-2/10, *Azienda Agro-Zootecnica Franchini Sarl and Eolica di Altamura Srl v Regione Puglia*, para 58.

[94] A similar conclusion was drawn by the author of this article in relation to the derogation clause of the Water Framework Directive. See in that regard: S. van Hees, ''Large-scale water-related innovative renewable energy projects and the Water Framework Directive – Legal issues and solutions'', 14 *Journal for European Environmental & Planning Law* 313, 334–336 (2017).

protecting habitats and species under the Habitats and Birds Directives, versus the interest of promoting the use of innovative water-related renewable energy, with regard to the quota in the Renewable Energy Directive. These issues are: *first,* a potential conflict between the Habitats and Birds Directives' goal to protect habitats and species, and the goal to produce more water-related innovative renewable energy with regard to the quota in the Renewable Energy Directive, and *second,* the lack of integration between the Renewable Energy Directive and the derogation clauses of the Habitats and Birds Directives. Tidal stream energy has been used as a case study to show the practical relevance of the legal issues at hand. This section discusses possible solutions to the aforementioned legal issues.

5.1 Dealing with uncertainty

In section 3.1 is was pointed out that the rules for the protection of Natura 2000 sites leave no room for uncertainty with regard to the environmental effects of a renewable energy project. In section 3.2 it was argued that the same applies to the rules for the protection of species. Both regimes require uncertainty about whether the project will cause a prohibited effect to be taken away, and if that is not possible then project authorisation should be refused. In cases in which it is not possible to take away scientific uncertainty, the most straightforward solution is to invoke the derogation clauses. There might, however, be situations in which it is undesirable to do so. This could be the case, for instance, if the habitats or species in question are in a relatively bad state already and that further deterioration is undesirable, even if it would be for the benefit of renewable energy production. Moreover, from the perspective of the precautionary principle the derogation articles should arguably only be used as a last resort, when all other policy options are exhausted.

In this regard "adaptive management" could be an interesting alternative policy option. Adaptive management is a flexible way of taking a licensing decision, which can be relevant for situations where there is a sufficiently important problem to necessitate taking action in the face of uncertainty. It requires a strong monitoring and evaluation process. The lessons learnt from this process will lead to better scientific understanding over time. These lessons are subsequently used to take a better informed decision at the next decision point. Adaptive management entails a circular process involving the repeated acquisition of new knowledge and adaptation of strategy on the basis of what has been learned. In this sense, adaptive management "allows decision makers at each juncture to make the best decisions they can with the information available at that time". Although an adaptive management process involves many steps,[95] the "learning by doing" aspect is seen as its most important characteristic. This definition of adaptive management is derived from the technical guide on adaptive management of the U.S. Department of the Interior (DOI).[96] A disadvantage of this definition of adaptive management is that it allows for possible negative effects to occur initially, so that they can be taken into account in the decision for a future project. This may not be compatible with the Habitats and Birds Directives, which – as discussed before – do not allow for negative effects to occur, nor allow the existence of uncertainty with regard to a project's negative effects. This issue can be solved by applying adaptive management in combination with mitigation measures, or by applying adaptive management in combination with "phased deployment". Both options are discussed hereafter.

5.1.1. Adaptive management in combination with mitigation

The European Commission recognises that adaptive management can be a useful decision making tool to allow projects to proceed in the face of uncertainty. It does, however, interpret adaptive management in its own way, with a strong focus on mitigation. According to the European Commission, the application of adaptive management to a project requires: a) a rigorous monitoring scheme, and b) a pre-defined validated package of appropriated corrective measures.

Such corrective measures must guarantee that the – initially unforeseen – negative effects of the project will be neutralised.[97] As discussed before, the DOI's interpretation of adaptive management aims at learning from monitoring results in order to improve decision making for *future* projects. The Commission views adaptive management as a way to adapt the *current* project while it is in operation in the case that negative environmental effects would occur. This resembles an approach that the highest Dutch administrative court has approved in 2007 in a case about a license for a large scale gas extraction project. The Dutch Court argued that the mere existence of

[95] "An adaptive approach involves exploring alternative ways to meet management objectives, predicting the outcomes of alternatives based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn about the impacts of management actions, and then using the results to update knowledge and adjust management actions.", B.K. Williams, R.C. Szaro, and C.D. Shapiro, *Adaptive Management: The U.S. Department of the Interior Technical Guide* (2009), Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC, p. 1.

[96] B.K. Williams, R.C. Szaro, and C.D. Shapiro, *Adaptive Management: The U.S. Department of the Interior Technical Guide* (2009), Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

[97] European Commission, *EC Guidance on the implementation of the EU nature legislation in estuaries and coastal zones* (January 2011), pp. 33–34.

remaining uncertainty over the nature and the intensity of the expected negative effects on the Waddenzee Natura 2000 site was an insufficient reason to refuse the license. The court pointed out that it was important in that respect that the –binding– adaptive management approach allowed for adaptation of the project when unforeseen effects of the gas extraction activities would occur. The approach aimed at preventing that the project would adversely affect the integrity of the protected site. It aimed to do so by establishing –prior to implementation of the project– maximum thresholds for possible negative effects. The adaptive management strategy would then allow to limit or stop the gas extraction activities if monitoring results showed that these thresholds would be exceeded, or threatened to be exceeded.[98]

This approach to adaptive management allows projects to go ahead even when on the basis of current scientific knowledge it cannot be excluded that the integrity of the protected site will be harmed, or that protected species will be disturbed by the project.

An example of how the adaptive management approach in combination with mitigation can be used with respect to tidal energy is given in the UK by the SeaGen tidal energy project in the *Strangford Lough*, a coastal inlet in Northern Ireland. This was a 1.2 MW project, consisting of two tidal turbines that were fixed to the seabed. The nature and extent of effect on marine mammals from the device, and possible negative impacts, were unknown. The license for the project was subject to mitigation measures to reduce the potential for collisions between marine mammals and tidal turbines. In fact, the objective of the monitoring programme for this particular area was to ensure *no mortality* of marine mammals as a consequence of physical interactions with the turbine rotors. *Active sonar systems* were installed which could detect if an animal entered an area where there was a risk for it to be harmed by a turbine. Subsequently the sonar system was able to shut down the turbines for a short period of time, until the animal had moved away. As monitoring results were constantly analysed and fed back into the project management, it was found safe to reduce the action radius of the sonar system over some years, in order to reduce the number of shutdowns.[99]

While adaptive management combined with mitigation measures can be – and have been – used in a gas drilling, wind turbine[100] and small-scale tidal energy project in the EU, it is not likely to become a widely-used solution for solving conflict between the protection rules of the Habitats and Birds Directives' and large scale tidal energy projects. There are two main reasons for that. First, as some legal scholars have convincingly argued, there is a danger that adaptive management leads to a ''fait-accompli'' situation.[101] This means that when projects with uncertain negative effects are awarded a license, it may be difficult, due to political, physical and economic considerations, to reverse the already built project if it turns out to be harmful to protected habitats and species in a later stage. This may especially be true for large-scale projects. Therefore, it is advisable not to use the adaptive management approach in the most sensitive Natura 2000 sites, or close to the most vulnerable species.[102] Second, adaptive management in large-scale tidal energy projects can be problematic as not all negative effects can be solved merely by ''corrective measures'' like shutting down a turbine. Site avoidance by fish or marine mammals, barrier effects in relation to migrating fish and marine mammals, loss of foraging habitat of birds, avoidance effects related to noise during the construction phase, and sediment starvation are examples of effects that could occur in the *Oosterschelde* and *Pentland Firth* projects and that will not necessarily be solved by simply shutting down turbines. At the same time, other types of ''corrective measures'' – such as adapting the construction, lifting turbines out of the water or even decommissioning them – could be too costly and will therefore not always be a realistic option. Third, an ongoing precautionary shutdown of turbines if mammals are

[98] Raad van State, ECLI:NL:RVS:2007:BB2499, paras 2.13, 2.17.3 and 2.21, https://www.raadvanstate.nl/uitspraken/zoeken-in-uitspraken/tekst-uitspraak.html?id = 18065.

[99] G. Savidge, D. Ainsworth *et al.*, *Strangford Lough and the SeaGen Tidal Turbine*, in M. A. Shields, A. I. L. Payne (eds), *Marine Renewable Energy Technology and Environmental Interactions*, 157–159 (Springer 2014).

[100] The Dutch Council of State has accepted the use of adaptive management in the domain of species protection under the Habitats Directive (in this case: shutting down wind turbines during certain hours of the day) in a case on bat-wind turbine collisions. In this case, however, the measure was not sufficiently effective because it did not prevent the killing of certain bat species completely. See ECLI:NL:RVS:2015:438, para 4.2. Also see R. Frins and H. Schoukens, *Balancing Wind Energy And Nature Protection: From Policy Conflicts Towards Genuine Sustainable Development?* in L Squintani and H.H.B. Vedder (eds.), *Sustainable Energy United in* Diversity, 104 (EELF 2014) about the adaptive management approach in relation to the construction of 3 wind turbines in the Port of Antwerp, which were localized close to a SPA.

[101] R. Frins and H. Schoukens, ''Balancing Wind Energy And Nature Protection: From Policy Conflicts Towards Genuine Sustainable Development?'' in L Squintani and HHB Vedder (eds.), *Sustainable Energy United in* Diversity, 105 (EELF 2014); and H. Schoukens and A. Cliquet, ''Mitigation and Compensation under EU Nature Conservation Law in the Flemish Region: Beyond the Deadlock for Development Projects?'', 10(2) *Utrecht Law Review* 194, 207 (2014).

[102] R. Frins and H. Schoukens, ''Balancing Wind Energy And Nature Protection: From Policy Conflicts Towards Genuine Sustainable Development?'' in L. Squintani and H.H.B. Vedder (eds.), *Sustainable Energy United in* Diversity, 104–105 (EELF 2014) for further analysis of the risks of the adaptive management approach.

approaching, might substantially decrease a large scale projects' profitability, making its construction less financially viable. Moreover, ongoing precautionary shutdowns could prevent projects from gathering essential information on mammals' ability to avoid or evade the moving blades, which could mean that uncertainty stays intact instead of being removed through monitoring.[103]

The applicability of adaptive management in combination with mitigation measures to tidal energy projects will therefore most probably be limited to the construction phase – e.g. through the pausing of piling activities when a marine mammal is observed nearby the construction site – or to small-scale projects such as the project in the *Strangford Lough*. Large-scale tidal energy projects are more likely to benefit from adaptive management combined with a so-called "phased deployment" approach.

5.1.2. Adaptive management in combination with phased deployment

Marine Scotland is the competent authority for most tidal energy projects in Scotland and it has developed a so-called "survey deploy and monitor" policy that is very much similar to adaptive management as described by the DOI.[104] For larger scale projects, however, "consent is likely to be conditional upon the company deploying the devices in a phased approach."[105]

Phased deployment means that the development will start at a small scale, for instance with a few turbines only. This first phase will –although the exact scope of its negative environmental effects may be unknown– because of its small size never cause a prohibited negative effect on protected habitats or species. There will however be a clear intention to considerably scale up the project in the future. In order to inform future phases of development the initial small-scale project will be bound to intensive monitoring requirements. The approval of subsequent phases of development will only be granted if the competent authority is certain that the nature protection-related risks of the large-scale development are well understood (based on the information gathered from the monitoring at the small-scale project).[106] Phased deployment is not a mitigation measure, but rather a policy to postpone the implementation of large-scale developments until sufficient environmental data has been gathered. An example of how the phased deployment approach can be applied is provided by the *Pentland Firth* tidal energy project in Scotland – which is one of the case studies discussed in section 2. While the project proposal refers to a deployment of up to 61 tidal turbines,[107] the turbines will be installed in stages and the first phase has been restricted to 6 turbines. Monitoring is required to inform decisions on future deployments and further environmental assessments will be required before further deployments are authorised in order to ensure that full consideration is given to any potential increase in impacts on the relevant Natura 2000 site an species.[108]

Adaptive management combined with phased deployment is an interesting policy option for renewable energy developments that are coping with uncertainty. It allows these developments to proceed anyway – although on a small scale – while gaining more scientific knowledge over time.[109] This may be important as there can be doubts about the effectiveness, feasibility and – in the case of sand suppletion – the legality of mitigation measures in relation to tidal energy projects.[110] A clear disadvantage of phased deployment is, however, that it risks to slow down the transition to an increased innovative renewable energy supply in 2020, which actually requires a rapid development of large-scale –rather than small-scale– energy projects. Moreover, initial phases of projects may point out that not all prohibited negative effects of innovative water-related energy projects can be prevented. Therefore, subsequent phases may be denied authorisation after all. In that case the only solution left may be to use the derogation clauses of the Habitats and Birds Directives. Yet, even when the derogation clauses are applied it may still be useful to apply an adaptive management approach combined with phased deployment. When the derogation clauses

[103] G. Savidge, D. Ainsworth *et al.*, *Strangford Lough and the SeaGen Tidal Turbine*, in M. A. Shields, A. I. L. Payne (eds), *Marine Renewable Energy Technology and Environmental Interactions*, 161 (Springer 2014).

[104] Marine Scotland's "Survey, deploy and monitor licensing policy guidance" (version 2) states on page one that that guidance "[. . .] is designed to enable novel technologies whose potential effects are poorly understood to be deployed in a manner that will simultaneously reduce scientific uncertainty over time whilst enabling a level of activity that is proportionate to the risks."

[105] Marine Scotland, *Survey, deploy and monitor licensing policy guidance* (version 2), http://www.gov.scot/Topics/marine/Licensing/marine/Applications/SDM, p. 6.

[106] Marine Scotland, *Survey, deploy and monitor licensing policy guidance* (version 2), http://www.gov.scot/Topics/marine/Licensing/marine/Applications/SDM, pp. 6–7.

[107] Marine Scotland, *MeyGen Decision, Decision Letter and Conditions*, http://www.gov.scot/Topics/marine/Licensing/marine/scoping/MeyGen/DecisionLetter, p. 25.

[108] Marine Scotland, *MeyGen Decision – Appropriate Assessment*, http://www.gov.scot/Topics/marine/Licensing/marine/scoping/MeyGen/AppropriateAssessment, p. 77.

[109] Or as Marine Scotland puts it: "[the Survey, deploy and monitor licensing policy guidance] is designed to enable novel technologies whose potential effects are poorly understood to be deployed in a manner that will simultaneously reduce scientific uncertainty over time whilst enabling a level of activity that is proportionate to the risks." Marine Scotland, *Survey, deploy and monitor licensing policy guidance* (version 2), http://www.gov.scot/Topics/marine/Licensing/marine/Applications/SDM, p. 1.

[110] See section 3.4.

are used, it is no longer required to obtain absolute certainty as to the absence of prohibited negative effects of the first phase on habitats and species.[111] The first phase may therefore consist of a larger and more risky project than in a situation without application of the derogation clauses. However, monitoring results collected during the first phase of the project could still be used to feed into the decision making process of future phases. If these results show that negative effects do not occur, then it would not longer be necessary to invoke the derogation clauses for future phases of the project.[112]

5.2 Towards better integration

In section 4.2 it has been argued that there is fragmentation between the derogation clauses of the Habitats and Birds Directives on the one hand, and the goals of the Renewable Energy Directive on the other hand. This fragmentation is caused by the lack of specification in the derogation clauses of *to what extent* renewable energy *can and should* be taken into account in those articles. It also remains unclear what the importance of renewable energy is compared to the protection of habitats and species. These unclarities may hamper the carrying out of a fair balancing act between habitats and species protection and renewable energy interests under Articles 6(4) and 16 of the Habitats Directive and Article 9 of the Birds Directive.

The introduction of detailed national renewable energy plans per Member State could be a practical solution to the issue of fragmentation. Such plans would indicate *which types of projects at which sites* are essential in the light of achieving the Member State's renewable energy quota under the Renewable Energy Directive, and which are not.[113] It should be flexible plans, that allow for additions and alterations, as policy and technological developments progress over time. The guidance given by a detailed national renewable energy plan can be used by competent authorities to justify and explain the use of their discretionary powers under the derogation clauses of the Habitats and Birds Directives. If a competent authority is aware at an early stage of the great importance –or the low importance, for that matter– of a specific renewable energy project at a specific site, then it will be better positioned to weigh the interest of that specific renewable energy project against the interest of protecting habitats and species. In some Member States innovative water-related forms of energy production –such as tidal energy– would feature in the national renewable energy plan, while other Member States may choose to focus on other forms of energy. This may for instance be the case if the Member State in question does not have water bodies that are suitable for tidal energy developments, or if a Member State can reach its renewable energy targets by using other sources of energy that have less negative environmental impacts. In that sense, the national renewable energy plan would also, in an early stage, contribute to fulfilling the derogation articles' condition on research into suitable alternatives. The main advantage of introducing detailed national renewable energy plans is that such plans could help competent authorities to take decisions under the derogation articles that fit within the broader renewable energy strategy of the Member State in question. Without such a plan there is a chance that these decisions are taken in isolation, resulting in arbitrary decisions that are founded in the individual enforcement priorities of the competent authority in question rather than in broader policy objectives.[114]

Moreover, the importance of having a renewable energy plan of the type described above, is emphasised by the European Commission's arguments in the *Schwarze Sulm* case. While this case is about the protection of water quality under the Water Framework Directive (WFD), it provides insights in the importance of having a well thought out and detailed renewable energy plan per Member State. In the Schwarze Sulm case the Commission questioned the relevance of a specific hydro-energy plant for Austria's energy supply by arguing that "hydroelectricity is only one source of renewable energy among others and that the energy produced by the hydropower plant [. . .] will have only a minor impact on the regional and national energy supply".[115] In other words, the Commission

[111] Under the derogation clause of Article 16 Habitats Directive it is still required that the favourable conservation status of the protected species is guaranteed. For further elaboration on that condition see the relevant footnote in section 6.

[112] A similar conclusion was drawn by the author of this article in relation to the derogation clause of the Water Framework Directive. See in that regard: S. van Hees, "Large-scale water-related innovative renewable energy projects and the Water Framework Directive – Legal issues and solutions", 14 *Journal for European Environmental & Planning Law* 313, 334–336 (2017).

[113] In that sense the plans proposed here differ from the "National renewable energy action plans" that Member States are required to make under the Renewable Energy Directive. These plans set out the measures that the Member States plan to take to promote and support the use renewable energy. They do not, however, contain a list of specific renewable energy projects that are essential in the light of achieving the Member State's renewable energy quota under the Renewable Energy Directive. See Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources, OJ 2009 L140/16, article 4 and annex VI.

[114] A similar solution was proposed by the author of this article in relation to the derogation clause of the Water Framework Directive. See in that regard: S. van Hees, "Large-scale water-related innovative renewable energy projects and the Water Framework Directive – Legal issues and solutions", *Journal for European Environmental & Planning Law* 14 (2017), pp. 334–336.

[115] European Court of Justice, Case C-346/14, *Schwarze Sulm,* para 82.

suggested that the hydro-energy plant was not sufficiently important in the light of Austria's renewable energy strategy, and is therefore not suitable to justify a deterioration of water quality via the WFD's derogation clause. In this specific instance, the ECJ dismissed the Commission's arguments because they were insufficiently substantiated. The arguments do suggest, however, that Member States need to present strong arguments under the derogation articles to show why a specific renewable energy project is necessary in the context of the Member State's renewable energy strategy. If Member States fail to do so, subsequent and better substantiated infringement procedures initiated by the Commission may at some point result in annulment of project authorisations of renewable energy projects. This could also happen in relation to the derogation clauses of the Habitats and Birds Directive. Similar to the WFD, these include – under the *important reasons of overriding public interest* condition – a balancing requirement that grant much policy discretion to competent authorities. The outcome of this balancing test can easily be contested – as has been done in the Schwarze Sulm case – by the European Commission, especially if it is not sufficiently substantiated. Detailed national renewable energy plans could contribute to a Member State's argumentation in this regard.

Inspiration for the implementation of detailed national renewable energy plans as meant in the present article can be drawn from the government approach currently used in the domain of large offshore wind parks in the Netherlands. In its national water plan the Dutch government designated a few areas for the development of offshore wind energy. It indicated that the development of wind parks outside of these areas would not be allowed. It has been decided that designated wind energy sites would not overlap with Natura 2000 sites in order to preclude the occurrence of significant effects. Additionally, the government carried out an Environmental Impact Assessment (EIA Directive) and an Appropriate Assessment (Habitats Directive) in order to assess the suitability – in terms of environmental protection – of the areas proposed for the development of wind energy. These assessments also advise on the application of mitigation measures.[116] This approach differs from the one proposed in this paper as it only concerns offshore wind energy developments. Moreover, it is not an all-encompassing strategy or list that lead to achieving the Netherlands' 14 per cent renewable energy quota as it does not cover all renewable energy projects needed to reach that percentage. Nevertheless, the Dutch water plan seems to provide guidance with regard to the use of the discretionary powers under the derogation clauses of the Habitats and Birds Directives. This can be illustrated by the following example. In an official decision to designate an area as a site for wind energy development, it was concluded that the designation of that site would result in a certain degree of habitat loss for 11 species of wild birds. This would be an infringement of the Dutch law that implements the Birds Directive. In the decision the competent authority reasoned that the designated wind energy sites that are included in the water plan have been selected carefully. Moreover, it emphasised that during the selection of those sites all interests have been weighed, including the nature protection aspects. It was also emphasised that pursuant to the Dutch law on wind energy at sea, the authorisation for wind energy farms can only be given within designated sites. Therefore it was concluded that there are sufficient guarantees that the wind energy project is built on the most suitable location and that there are no suitable alternatives. It appears from the foregoing that the competent authority in question used the water plan for its reasoning under the *alternatives* condition of the Birds Directive's derogation clause.[117] By doing that, the competent authority placed its decision in the wider context of the national renewable energy policy – instead of deciding upon the plans on a pure case-by-case basis. In that sense the Dutch approach can be used as inspiration for the detailed national renewable energy plans as meant in this article.

In conclusion, this article recommends the development of a practical framework to bring about an increased integration between the Habitats and Birds Directives and the Renewable Energy Directive. This framework could take the form of Member State-specific detailed renewable energy plans. The proposed renewable energy plans would list the renewable energy projects that are important for reaching the Member States renewable energy quota under the Renewable Energy Directive (RED). These plans must be drafted on a Member State level rather than on an EU level, as the RED sets Member State-specific renewable energy quotas and leaves the Member States a considerable amount of policy discretion as to how to reach those quotas.

VI. Conclusion and Final Observations

The development of innovative water-related renewable energy techniques – such as tidal energy – risk to

[116] Ministerie van Infrastructuur en Milieu/Ministerie van Economische Zaken, *Rijksstructuurvisie Windenergie op Zee – Partiële herziening van het Nationaal Waterplan Hollandse Kust en Ten Noorden van de Waddeneilanden* (September 2014), pp. 16–17 and 20; Ministerie van Infrastructuur en Milieu/Ministerie van Economische Zaken, *Beleidsnota Noordzee 2016–2021 – Bijlage 2 bij het Nationaal Waterplan 2016–2021*, December 2015, pp. 83–86.

[117] Staatscourant 2016 nr. 14523 – 8 april 2016, *Kavelbesluit III windenergiegebied Borssele*, paras 7.5.2, 7.5.5, 7.5.7 and 7.5.8.

be hampered by the rules for the protection of habitats and species as laid down in the Habitats and Birds Directives. This may especially be the case if those techniques are applied on a large scale, and when there is ongoing scientific uncertainty concerning the negative effects of these techniques on protected habitats and birds. While mitigation measures and adaptive management are expected to be sometimes insufficiently effective to solve this issue, the Habitats and Birds Directives' derogation clauses are expected to play an important role in authorisation procedures of future large-scale tidal energy projects. Nevertheless, due to a lack of integration between those derogation clauses and the goals of the Renewable Energy Directive, there is currently no guarantee that a fair balance will be struck between the protection of habitats and species and renewable energy interests under the Habitats and Birds Directives. This article recommends to solve this lack of integration by introducing detailed national renewable energy plans per Member State, which would give a detailed overview of important renewable energy projects. These plans could help competent authorities in weighing the interest of a renewable energy project against the interest of protecting certain habitats and species. Inspiration for the implementation of these plans can be drawn from the approach for the designation of large offshore wind parks in the Netherlands. Nevertheless, it must be observed that increased integration stemming from detailed national renewable energy plans will not smoothen the application of all conditions of the derogation clauses. Problems may still arise from the strict requirements on compensation for Natura 2000 sites. As mentioned before, it is expected to be difficult to find suitable compensation sites for tidal energy projects.[118] Also the condition of the derogation clause in Article 16 that the favourable conservation status of protected species is guaranteed at all times may raise additional problems.[119] It could even lead to the refusal of projects in cases in which a successful appeal to the Natura 2000 derogation clause can be done. A final problem could be caused by the derogation clause of the Birds Directive, which does not include a derogation reason that can automatically be linked to renewable energy.[120] While it is argued in this article that this will probably not cause problems in practice, the ECJ has to date not given a decisive answer in this regard.

Apart from tidal stream energy projects, other forms of innovative renewable energy production – most notably wave energy, salinity gradient energy (blue energy) and tidal range energy – may also benefit from the findings of this article. Tidal range projects are expected to have considerable environmental impacts, and they may also be built in or in the vicinity of Natura 2000 areas.[121] The findings of this article may therefore also apply to tidal range projects. The considerations on mitigation and phased deployment might however not apply, due to the specific characteristics of tidal range, which uses artificial barrages and hydro energy turbines. Although not much research has been done into the environmental effects of wave energy, most existing studies estimate that wave energy installations will have limited environmental effects.[122] However, uncertainty remains as to the environmental implications of large-scale wave energy production in general and concerning possible collision risk and underwater noise effects on marine mammals in specific.[123] The findings of this article may also apply to wave energy if they have an effect on one or more protected habitats or species. Also large-scale blue energy installations can potentially negatively influence Natura 2000 sites and protected species. This could happen through the discharge of high concentrations of brackish water in the habitats of salt water organisms, and through thermal pollution caused by warm waste water which may be added in order to optimise the blue energy

[118] See section 4.1.3 for further elaboration on the compensation condition.

[119] "maintenance of the populations of the species concerned at a favourable conservation status in their natural range" is a condition under Article 12's derogation clause (Article 16 Habitats Directive). Nevertheless, this condition is interpreted somewhat less strictly by the Court of Justice than the way it is formulated in Article 16 Habitats Directive. According to the ECJ "the grant of [derogations under Article 16(1)] remains possible by way of exception where it is duly established that they are not such as to worsen the unfavourable conservation status of those populations or to prevent their restoration at a favourable conservation status." See European Court of Justice, Case C-342/05, *Commission v Finland*, paras 28–29. For further elaboration see B.A. Beijen, *De kwaliteit van milieurichtlijnen – Europese wetgeving als oorzaak van implementatieproblemen* [The quality of environmental directives – European legislation as a cause of issues of implementation] 184–185 (Boom Juridische Uitgevers 2010).

[120] See section 4.1.2. for further elaboration on the exhaustive list of derogation reasons of Article 9 Birds Directive.

[121] See for instance: UK Department of Energy & Climate Change, *Record of the Habitats Regulations Assessment undertaken under Regulation 61 of the Conservation of Habitats and Species Regulations 2010 (as amended) & Assessment of the project under article 4.7 derogation for the Water Framework Directive – Project Title: Tidal Lagoon Swansea Bay* (8th June 2015).

[122] International Renewable Energy Agency (IRENA), *Wave energy – technology brief* (June 2014), pp. 20–21; Streamlining of Ocean Wave Farms Impact Assessment (SOWFIA), *Deliverable D.2.4 – Interim report on barriers, accelerators and lessons learned from all wave energy site experiences* (March 2012), p. 30.

[123] Streamlining of Ocean Wave Farms Impact Assessment (SOWFIA), *Deliverable D.2.4 – Interim report on barriers, accelerators and lessons learned from all wave energy site experiences* (March 2012), p. 30.

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production process.[124] Large-scale salinity gradient energy plants may also cause increased mortality of protected fish as fish may be sucked into the installation and may suffer physical damage and disorientation.[125] Whether the above mentioned effects will actually occur strongly depends on the type of production process that will be chosen for future wave and blue energy projects. If they occur – or if there is a risk that they will occur – then the findings of this article on dealing with uncertainty and better integration will also be applicable to those innovative water-related renewable energy techniques.

The solutions that are discussed in this article help to address legal issues that arise at the interface between renewable energy policy and the Habitats and Birds Directives. Water-related innovative renewable energy projects may, however, also have negative effects on water quality as protected by the Water Framework Directive.[126] Solving issues that are related to the Habitats and Birds Directives does therefore not automatically mean that a specific project will be permissible under EU law. It will sometimes also need to undergo the authorisation procedure prescribed by the Water Framework Directive.[127] The interaction between innovative water-related renewable energy projects and the Water Framework Directive raises legal issues of its own. These are, however, similar to the ones discussed in relation to the Habitats and Birds Directive. Legal issues on the interface between large-scale water-related innovative renewable energy projects and the Water Framework Directive, and possible solutions, have been discussed in an earlier article by the present author.[128]

[124] F. Helfer, C. Lemckert and Y.G. Anissimov, ''Osmotic power with pressure retarded osmosis: theory, performance and trends: a review'', 453 *Journal of Membrane Science* 337 (2014); M. Janssen, A. Härtel, R. van Roij, *Boosting capacitive blue-energy and desalination devices with waste heat*, 113 Physical Review Letters 268501 (2014).

[125] A. Cipollina, G. Micale (eds), *Sustainable Energy from Salinity Gradients*, 316 (Woodhead Publishing 2016).

[126] S. van Hees, ''Large-scale water-related innovative renewable energy projects and the Water Framework Directive – Legal issues and solutions'', 14 *Journal for European Environmental & Planning Law* 313 (2017).

[127] Specific mitigation and adaptive management strategies that are targeted at solving a project's negative effects on habitats and species may not automatically also solve the possible deterioration of water quality caused by that project. Moreover, it has been argued in academic legal literature on water law that ''the invocation of the derogation regime of the WFD cannot be used to derogate from the objectives and obligations laid down in other directives''. See in that regard P. De Smedt and M. van Rijswick, *Nature conservation and water management – One battle?*, in C-H. Born, A. Cliquet *et al* (eds.), *The Habitats Directive in its EU Environmental Law Context – European Nature's Best Hope?*, 425 (Routledge 2015).

[128] S. van Hees, ''Large-scale water-related innovative renewable energy projects and the Water Framework Directive – Legal issues and solutions'', 14 *Journal for European Environmental & Planning Law* 313 (2017).