High speed rail comparative strategic assessments in EU member states

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Abstract

This paper explores the role and capacity of strategic level assessments in addressing the strategic dimension of High Speed Rail (HSR) proposals and influencing decision-making processes. The overall research objective was to find out to what extent opportunities for strategic thinking are being undertaken in HSR. Three different cases of high speed rail were compared – High Speed Rail 2 (HS2) in the UK, High Speed Rail Network (RFAV) in Portugal and European Gauge Railway Line Kaunas in the Lithuanian-Latvian Border (Rail Baltica 2). Strategic Environmental Assessment (SEA) effectiveness literature was reviewed to draw on criteria that could establish a comparative framework to explain how environmental and sustainability assessments were undertaken in the three aforementioned European high speed rail case studies. Research results allow us to conclude that an SEA or a sustainability assessment/appraisal (SA) will be most beneficial if developed before any HSR project to first determine if HSR is really necessary and strategically justifiable to the achievement of both environmental and sustainability objectives. Results achieved suggest that even though the SEA and SA in the three cases studied can be said to have influenced the planning process mostly at project-level decisions, it also shows a missed opportunity to contribute to developing a high level strategy for HSR that addresses several strategic issues, assessing options before they are undertaken.

KEYWORDS: Strategic Environmental Assessment, Sustainability Appraisal, Sustainability Assessment, High Speed Rail, Strategic Issues, Strategic Dimension

Introduction

Thanks to transport systems, accessibility and mobility have vastly improved enabling the development of modern societies and economic growth. However, these transport activities come with negative impacts related to CO_2 emissions, accidents, land take, landscape fragmentation, land use changes and others. Current major challenges, such as demographic evolution, urbanisation, the scarcity of natural resources, increases in oil and energy prices and increase in travel demand, mean there is a need for more efficient, sustainable transport solutions, one of which could be rail, especially High Speed Rail (HSR) (Jehanno et al. 2011).

The European Union promotes the rail network to reinforce the economic, social and political cohesion of the Union by integrating peripheral regions in the longer term, as part of an EU-wide transport policy to improve territorial integration (Jehanno et al. 2011).

A European HSR network is an infrastructure of such magnitude, and with such repercussions on the environment, economy and population's lives that the importance of strategically assessing its sustainability and environmental issues can be hardly questioned. And indeed, instruments such as Strategic Environmental Assessment (SEA) and Sustainability Assessment/Appraisal (SA)[1] have been used with the intention to support the decision-making processes.

Scholars on SEA have agreed that the purpose and aims of SEA change depending on the planning and decision-making context in which it is applied (Partidario 2000; Sheate et al. 2003; Hilding-Rydevik & Bjarnadóttir 2007; Bina 2008; Tetlow & Hanusch 2012; White & Noble 2013). Fischer (2007) states that the role of SEA is to take environmental and possibly other sustainability aspects

[1] In the UK the term 'Sustainability Appraisal' is used for the more internationally accepted term of Sustainability Assessment (Morrison-Saunders et al, 2015).

into consideration in policy, plan and programme (PPP) making above project level, while João and McLauchlan (2014) believe SEA "has as its broad aim the inclusion of environmental considerations into strategic decision-making" (João & McLauchlan 2014: 87). With a more strategic approach, Partidário (2015) believes SEA should be "an instrument of change towards more sustainable patterns of behavior and development, by following strategic thinking and constructive approaches" (Partidário 2015: 1). The author also states that SEA must incorporate environmental issues earlier on, integrating them in the strategic decision-making process and formulating and discussing strategic alternative options. Furthermore, if 'strategic thinking' SEA could be attained, it could "facilitate decision-making by involving key actors, enabling dialogues towards mutual understanding, offering flexibility, [and] ensuring a long-term and large scale perspectives when considering development options that help to meet sustainability aims" (Partidário 2015: 6).

Therefore, instead of focusing on assessing environmental or sustainability impacts of proposals, a strategic nature SEA or SA would instead identify and address strategic issues that could enable the integration of long term broader sustainability issues at early stages in view of preventing potential impacts. In line with this thinking, conducted research has explored which strategic issues could be important to help understand the strategic dimension in a transport system such as HSR in the context of the application of SEA and SA.

The main goal of this paper is therefore to explore to what extent opportunities for strategic level assessments have been explored in the HSR network in Europe, in particular, how SEA and SA have incorporated the strategic dimension in HSR transport system. In order to do so, three different strategic level assessment cases of HSR were selected for a comparative analysis, from Portugal, Lithuania-Latvia, and the UK. A common framework for comparative analysis was adopted, attempting to answer two research questions: 1) Is SEA/SA addressing strategic issues? and 2) How is SEA/SA influencing the decision-making process? In order to answer these questions, we seek to determine if there were only operational issues considered, or if there were also strategic issues addressed, and if the SEAs/SA were useful for making a decision regarding the respective HSR plans.

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Research methodology

The research was driven by the overall research objective to find out to what extent opportunities for strategic assessment are being undertaken in HSR, with the single purpose of comparing the *nature* of SEA/SA in the three case studies using two research questions: 1) how strategic issues were addressed and 2) what influence they had in decision-making. The research methodology (**Error! Reference source not found.**) was based on a literature review and case-study analysis to enable answering the two research questions as above.

Different SEAs/SAs could also be compared in relation to the *effectiveness* of SEA/SA in delivering intended outcomes in each of the cases, however that would imply covering a much larger number of factors and considering a plurality of perspectives (Cashmore *et al.*, 2010; Sheate and Eales, 2016) which this paper deliberately did not want to address. It would also require a very different evaluation methodology and logic model, as well as access to actors/practitioners and other stakeholders

involved in the specific cases, which can be the object of a subsequent paper. The literature review addressed three different aspects. A review of environmental and sustainability assessment in order to better understand concepts and challenges in implementing instruments such as Strategic Environmental Assessment (SEA) and Sustainability Assessment/Appraisal (SA) in policies, plans and programs. A literature review was also undertaken to identify what would be strategic issues in HSR that presumably should be addressed in strategic level assessments. Additionally, a review of SEA effectiveness understanding was undertaken with the sole purpose to appreciate how a range of authors characterise an 'ideal' or 'effective' SEA process, and which criteria or factors are used to promote good or best practice. As the review of effectiveness literature was not intended to build a comprehensive effectiveness evaluation framework it did not seek to be comprehensive.

Based on this review, a simplified framework of environmental and sustainability assessment criteria was adopted, and a range of HSR strategic issues identified, to enable a comparative assessment of the *nature* of SEA/SA undertaken in the three case studies. The criteria were selected based on the extent they could be used to answer this paper's research questions: how strategic was the SEA/SA, and what influence the assessments had on decision-making.

The selection of case studies also followed three criteria: 1) all case studies should be European; 2) have their assessment reports publicly available; 3) have reports available in English or in Portuguese. As a result, three different environmental and sustainability reports of high speed rail from EU member states were collected and analysed:

- Portugal: Strategic environmental assessment of the high speed rail network (RFAV);
- UK: Appraisal of sustainability (AoS) of HS2 (London to the West Midlands);
- Lithuania-Latvia: Strategic Environmental Assessment Report of the European Gauge Railway Line Kaunas – Lithuanian-Latvian Border (Rail Baltica 2).

While the UK case study is an AoS[2] and the other two are SEAs, they were considered comparable instruments in this context, with similar object and scope of assessments, as well as general methodological approaches. All three cases follow the requirements in the SEA Directive, with the AoS being the assessment with the most strategic and integrated perspective of the three cases considered given the nature of AoS. But in the context of the research question of this paper, different detailed methodological aspects were considered not relevant to distinguish the cases. A comparison of the three case studies was conducted using the adopted framework of criteria and the results analysed.

<Figure 1>

Comparative assessment framework on the strategic nature of SEA/SA in HSR

Based on the review of the criteria used in existing best practice frameworks in the literature, a selection was made based on the potential of the respective criteria to assess the extent to which a

[2] The term 'Appraisal of Sustainability' (AoS) in the UK is normally reserved for a specific form of Sustainability Appraisal in relation to National Policy Statements that provide the framework for nationally significant infrastructure projects (NSIPs), governed by the Planning Act 2008 (see Sheate, 2017). The use of the term in the case of HS2 appears to have been to distinguish it from the normal use of Sustainability Appraisal which is for local authority development plans. Both AoS and SA in the UK are *normally* expected to meet the requirements of the SEA Directive.

strategic and influential SEA process would have been carried out in each of the three selected case studies, including the reflection in changes to the PPPs.

The focus was a comparison of core components of best practice.

It was found that one of the most fundamental criteria for best practice SEA is **Public Participation,** which contributes to the quality of the SEA process (Wang et al. 2012) and must occur as early as possible (Zhang et al. 2013). An open participative process with both stakeholders and affected public throughout the decision-making process assures their interests and concerns will be reflected in the final PPP (Acharibasam & Noble 2014; van Buuren & Nooteboom 2009; IAIA 2002), improving the legitimacy of the PPP proposal, affecting the assessment and influencing the decision (Hanna & Noble 2015). The interaction between stakeholders with different interests and strategies allows a stronger SEA (Lobos & Partidário 2014) with a shared vision and a discussion on strategic priorities, problems and rules for sustainable development (Partidário 2012). This is also consistent with the need under the 1998 UNECE Aarhus Convention on Access to Information, Public Participation and Access to Justice in Environmental Matters for 'early and effective' public participation when options are still open, in part reflected in the SEA Directive.

There is also widespread agreement that the **Entry point** and the **Timing** of the SEA are crucial for its best practice (Wang et al. 2012; Acharibasam & Noble 2014). If SEA is initiated at the start of the planning process, stakeholders can be engaged in providing inputs which can be integrated in the process, and changes in the PPPs more likely to be made (van Buuren & Nooteboom 2009). The information resulting from the assessment in the early stages is also more likely to influence the decision-making process (IAIA 2002). If the SEA is involved too late, and PPP proposals would have been already formulated, needed changes become more difficult to implement (Zhang et al. 2013). Coming in late, the SEA gets limited to evaluate specific development proposals resulting in the preparation of a report. But if, in fact, the SEA is introduced early, it can discuss the definition of strategic aims and influence the development of alternative options to be considered (Lobos & Partidário 2014).

Interactivity is another critical factor in SEA best practice which relates to the communication and cooperation between SEA and planning practitioners throughout the decision-making process (van Doren et al. 2013). This process can ensure an adequate environmental assessment of all strategic decisions relevant to achieve sustainable development (IAIA 2002) as well as considering impacts beyond the immediate time scale of the PPP when applying strategic assessment (Hanna & Noble 2015). The interactivity and synchronisation between SEA and planning is essential for both processes to succeed and it can influence changes that SEA applies to the PPP (van Buuren & Nooteboom 2009; Lobos & Partidário 2014). This integration needs to occur at an early stage in order to facilitate a process of collaborative governance, consensus building and joint fact finding (Zhang et al. 2013).

Another factor that was mentioned by most authors on the subject of evaluating SEA best practice or effectiveness is **legal foundation/requirements**. According to some authors, SEA must be backed up by existing legislation (Zhang et al. 2013) which provides clarity for stakeholders and constitutes a legal basis for participation and accountability requirements (Hanna & Noble 2015), ensuring the

compliance of the PPP (Acharibasam & Noble 2014). Wang et al. (2012) believe this criteria is also important because each SEA system operates differently depending on the political, legal and administrative context, since the SEA effectiveness is context dependent. In her strategic thinking concept of SEA, Partidário (2012) considers the **Strategic Reference Framework (SRF)** as a more strategic way of incorporating legal foundations, using a framework of strategic macro policies as a critical element for SEA effectiveness. While legal requirements are used to control practice, a SRF is used to provide directions, i.e. a direction of travel towards aspirations expressed in wider policies and so beyond what may be established in legislation (which may be, and often is, *de minimis*). In this way best practice, rather than mere compliance, is encouraged. SRF sets the reference for strategic assessment in PPP processes by considering the objectives and targets of long-term macro-policies, thus setting a strategic direction for SEA (Lobos & Partidário 2014).

In SEA, the **Scope of assessment** should include biophysical, social and economic aspects (IAIA 2002) "in an integrated and holistic way" as opposed to being restricted to biophysical and social aspects of the environment separately. However current practice dominantly shows that SEA tend to focus only on the identification of isolated environmental impacts (Lobos & Partidário 2014). In a strategic thinking approach to SEA, Partidário (2012) resorts to Critical Decision Factors (CDF) to "materialize the concept of scoping at strategic levels" (Partidário 2012: 38). The CDF are ideally integrated and holistic key themes that can be described "as windows of observation to focus attention on the strategic environment and sustainability issues that matter in the assessment" (Partidário 2012: 61). In order to answer one of the research questions of the present paper, a literature review was undertaken to find out which **strategic issues** are typically addressed when relating to HSR, and which, in our understanding, should be addressed in the scope of assessment. These issues can be defined as "critical challenges associated to the object of assessment, that must be addressed to achieve long-term vision" (Partidário 2012: 63).

Tools and techniques (T&Ts) can be a good criterion to assess the SEA practitioners' ability to undertake strategic assessment (Lobos & Partidário 2014). If deterministic analysis tools and techniques are being used to describe environmental factors and predict environmental consequences, then typically a more technocratic-rationalistic approach is in place, and an EIA-based SEA is being carried out. In a more strategic-thinking[3] SEA techniques and tools - typically more participatory techniques such as workshops - "are used for strategy making in complex, dynamic, and uncertain settings" thus improving cooperation, communication and collective learning (Lobos & Partidário 2014: 41). Wang et al. (2012) consider 'the quality of methods and techniques' to be an indicator for procedural effectiveness asserting they should be flexible, innovative (Hanna & Noble 2015) and adaptive (Zhang et al. 2013).

It is recognised that there is always **Uncertainty** associated with assessments due to the involvement in complex systems (Lobos & Partidário 2014), and some authors consider it can serve as an obstacle to an effective SEA (Zhang et al. 2013). It is important that all uncertainties and assumptions are disclosed and considered in the decision (Hanna & Noble 2015), but it is also important that

[3] Strategic-thinking can be defined as having a vision over long-term objectives, flexibility to work with complex systems, adapting to changing contexts and circumstances, as well as being strongly focused on what matters in a wider context (Partidário 2012).

uncertainty be accepted and not limit SEA. This can be achieved by creating a dynamic PPP which can respond to changes over time (Lobos & Partidário 2014).

Monitoring and Follow-up are often associated to SEA, like in EIA, (Zhang et al. 2013) to assess the efficacy of mitigation requirements (Hanna & Noble 2015), stressing that it should include guidance for post-implementation monitoring or evaluation (Acharibasam & Noble 2014). However, follow-up should instead understand changes that occurred in the implementation of strategies as well as in its context. Hence, follow-up needs to analyse the governance and processes of action instead of focusing only on monitoring environmental and sustainability indicators (Lobos & Partidário 2014). This would therefore be an on-going process of facilitating environmental and sustainability issues in the decision-making process (Partidário 2012).

Wang et al. (2012) consider the contribution of SEA to decision-making and planning as well as the scientific and reasonable outcomes of the SEA to be indicators of substantive effectiveness. In order to understand the influence SEA had on the decision-making process one needs to look not only into the integration process but at the **Outcome of the SEA** as well. According to certain authors, the results of the SEA must be clearly accounted for in the decision (Hanna & Noble 2015) meaning that the SEA process must provide assessment results/information early enough to influence the development of the PPP (Acharibasam & Noble 2014). This means that if the outcomes of SEA are mainly assuring good quality information reporting with mitigation measures addressing the expected impacts of PPP proposals, then an EIA-based SEA was conducted. Alternatively, if the SEA outcomes are more linked to creating learning platforms and generating environmental and sustainability integrated designed PPP, revealing a holistic and integrated focus, than a more strategic approach would have been followed.

Although the following two criteria were only presented in the framework set forth by Lobos and Partidário (2014), it is believed that they better reflect the role of strategic-thinking SEA and therefore allow to determine to what extent strategic issues were addressed in the assessment of the three case studies.

- **SEA concept:** By knowing the concept practitioners attribute to SEA one can understand the role it plays in a strategic assessment process. If the role of SEA is to ensure consideration of environmental and possibly other sustainability issues to identify the potential environmental consequences of the PPP proposals and inform the planners, then we will be looking at an EIA-based SEA. However if the concept of the SEA is to create opportunities to design the PPP in a more environmental and sustainability inclusive and holistic way, which requires an early start of the SEA, is more proactive, then the final PPP proposal would already carry on the necessary ingredients to make them more environmentally integrated and sustainability oriented (Lobos & Partidário 2014).

- **Object of assessment:** Identifies what is going to be assessed (Partidário 2012). This is important to understand, since if the object of assessment is the planning outcomes then there would be no involvement of the SEA in the formulation of options and the SEA influence in the decision-making process would have been more operational over consequential actions. This means the SEA would have missed, or foreclosed the capacity to influence the decision-

making process by providing the strategic direction for PPPs. But this will be enable if the object of assessment is the strategic objectives or options, creating significantly more opportunities for the SEA to influence the decision-making process strategically (Lobos & Partidário 2014).

After due consideration to all reviewed frameworks, the framework proposed by Lobos and Partidário (2014) was selected for application to the three HSR case studies. It better assesses the extent of a strategic-thinking SEA because it is broader, it includes basically all the criteria suggested by the other authors reviewed, and listed in **Error! Reference source not found.**, while also incorporating other criteria such as the SEA concept, object of assessment and SRF that can better assess whether or not the strategic dimension was included in the assessment.

<Table 1>

Proposed framework

The proposed framework is almost entirely based on the framework established by Lobos and Partidário (2014) with two additional criteria that were needed in order to address the present paper's research questions: the scale and the influence on decision-making. **Scale** is relevant because during impact assessment wide ranging temporal and spatial scales (long-term to short-term temporal scale; global to site-specific spatial scale) need to be considered in the process, which can affect the identification of the problem if the right scale(s) are not used (Partidário 2007). The scales applied in SEA are important because they can fundamentally change the outcome of the assessment, since processes and parameters that are important at one scale may not be important at another scale (João 2002). **Influence on decision-making** is also relevant to determine the strategic capacity of SEA. Assuming there is always some degree of influence, we can distinguish the SEA influence between operational and strategic levels. If the influence of SEA is expressed only through subsequent actions, based on identified impacts, mitigation measures and a monitoring plan, than that shows that no change was introduced at the core PPP concept. If instead the influence of SEA is expressed through a strategic discussion of development options and adjustments of the PPP to fit environmental and sustainability priorities, which will determine PPP solutions that create more opportunities for sustainable development. It is therefore relevant to retrieve the possible evidence that can show how strategic the assessment was, what type of role SEA had in the decision-making process, and how important it was.

Based on the above, a framework was adopted for comparing the three case studies and assess how strategic was the SEA/SA, and the SEA capacity to strategically influence decision-making. The framework is presented in **Error! Reference source not found.**.

<Table 2>

Together with the above framework which is more SEA concept and process driven, a range of sector specific strategic issues (SI) were needed to identify what should the strategic scope of the compared HSR cases. Table 3 shows a range of SI that were identified in the literature as being relevant to address HSR strategically, and which we have selected to consider in the comparative analysis of the HSR cases.

<Table 3>

Case studies

Portugal: Strategic environmental assessment of the high speed rail network

The SEA assessed the project of the High Speed Rail Network (RFAV) plan, particularly the route alternatives (TT or T) and its stations (IDAD 2003). The goal of the future RFAV would be to connect the main mobility centres of people and goods in the coast of the Iberian Peninsula (Lisbon, Porto and Vigo) and Lisbon and Madrid. The RFAV is essentially based on a vertical structure between Vigo and Lisbon, passing by Leiria or Entrocamento, depending on the alternative connection to Spain, and namely to Madrid (**Error! Reference source not found.**) (IDAD 2003):

Alternative TT – It considers three transversal connections: one between Aveiro and Almeida/Salamanca, one between Lisbon/Ota and Elvas/Badajoz, and another between Évora and Faro/Huelva. The connection Porto/Lisboa is done passing through Leiria.
Alternative T – It only considers one transversal connection between Lisbon/Ota and Marvão/Cáceres, passing by Entroncamento. The connection Porto/Lisbon is done passing through Entroncamento.

<Figure 2>

The purpose of this SEA, which started at a plan level, was to identify the most sustainable route alternative and therefore ensure the sustainability of the RFAV in the transport sector as well as in the environment sector in Portugal. The SEA also provided measures to mitigate potential negative impacts resulted from the project (IDAD 2003).
In order to allow an integration of sustainability objectives with the project of RFAV, the SEA identified the main effects on the environment and territory for several environmental components, such as biodiversity, air, noise, accidents and territorial and urban dynamic, by mainly identifying biophysical aspects. There was a very limited interactivity in the SEA process except for the acknowledgement in the *Environmental Report* (IDAD 2003) that “the integration with the planning process is highly recommended in the follow-up activities” (Coutinho et al. 2004b: 7). Additionally, public consultation was not integrated in the SEA process due to the fact that the process was a “voluntary exercise”

(Coutinho et al. 2004a). Regarding the applied scales, the SEA focused on a national level for a period of assessment of 15 years, between 2010, the base year, and 2025 (IDAD 2003).

UK: Appraisal of sustainability of HS2 (London to the West Midlands)

The purpose of the Appraisal of Sustainability (AoS) was "to provide design guidance to the development of the route (and stations) options; to enable differentiation to be made between options in terms of their sustainability performance relative to each other; and to identify mitigation that can improve the preferred route option that became the proposed scheme" (Booz & Co. (UK) & Temple Group Ltd 2011c: 24) by informing the design team and providing recommendations to HS2 Ltd (**Error! Reference source not found.**). However, this was a rather unique application of AoS, which is normally reserved for SEA Directive-compliant appraisals of national policy statements (NPSs) that set the framework for nationally significant infrastructure projects (NSIPs) under the Planning Act 2008.

Its aim was to assess how HS2 would support or conflict with objectives for sustainable development. These objectives as well as the definition for sustainable development were taken from the UK Sustainable Development Strategy: Securing the Future (HM Government 2005) and formed the basis of the AoS. The objectives were (Booz & Co. (UK) & Temple Group Ltd 2011b: 39):

- Reducing greenhouse gas emissions and combating climate change;
- Natural resource protection and environmental enhancement;
- Creating sustainable communities; and
- Sustainable consumption and production.

<Figure 3>

The AoS was undertaken for the route proposed by the Government between London and the West Midlands for the new high speed railway, High Speed Two (HS2) (**Error! Reference source not found.**). Table 4 lists the aspects included in the proposed scheme besides 225 km of new railway (Booz & Co. (UK) & Temple Group Ltd 2011b: 1):

<Table 4>

<Figure 4>

According to the AoS, the role of sustainability was first emphasized in the scheme development (Booz & Co. (UK) & Temple Group Ltd 2011a) by establishing sustainability design aims, based on the aforementioned four UK priorities, which were relevant to all stages of scheme development and defined essential principles for the design of the options, namely focusing on aspects that would have a negative effect on route and station engineering.

In order to determine if HS2 "reflects and promotes sustainable development" (Booz & Co. (UK) & Temple Group Ltd 2011b: 2), the AoS was described as aiming to integrate environmental, social and

economic issues such as climatic factors and adaptability, biodiversity, air quality, soil and land resources, community integrity, health and well-being, security and safety, economic prosperity, etc. The AoS assessed the area between London and the West Midlands and considered the following dates of assessment: 2017, the predicted date of commencement of the construction of HS2; 2026, the year high speed services would start; and 2040, the year in which the HS2 would've been operating for 15 years (Booz & Co. (UK) & Temple Group Ltd 2011b). The Supreme Court[4] (as did lower courts) (Sheate, 2017) found that the AoS for Phase 1 (London to the West Midlands) would not have met the requirements of the SEA Directive had the Directive applied (because it addressed only part of the route being consulted upon), but it found that the SEA Directive did not apply because the *Decisions and Next Steps* document (Department for Transport 2010) – the decision to proceed with developing HS2 – did not set the framework for the subsequent EIA, which was subject to the Parliamentary Hybrid Bill process (Parliament being sovereign and therefore could – according to the court – decide what it likes)[5].

Lithuania-Latvia: Strategic Environmental Assessment Report of the European Gauge Railway Line Kaunas – Lithuanian-Latvian Border

The objectives of the SEA were to (Sweco Lietuva UAB 2013b: 11):

- Establish, describe and assess the potential significant consequences of implementation of the solutions upon the environment;
- Ensure that consultations with certain state and local authorities and the public are held and results of such consultations and other publicity measures are taken into consideration;
- Ensure that the organisers have detailed and reliable information on the potential consequences of implementation of the solutions upon the environment and take it into consideration.

The SEA aimed to assess and compare the alternative options of the European Gauge Railway Line from Kaunas to the Lithuanian-Latvian Border, represented in **Error! Reference source not found.**, which are (Sweco Lietuva UAB 2013):

- Option A: Kaunas – Panevėžys – Border ("Border" hereinafter meaning the Lithuanian-Latvian Border);
- Option B: Kaunas – Šiauliai – Border.

<Figure 5>

There was therefore limited interactivity since the SEA was only carried out once the route alternatives of the plan were already established. The main goal of the assessment was to merely assess those

[4] *R (on the application of HS2 Action Alliance Limited) (Appellant) v The Secretary of State for Transport and another (Respondents)* [2014] UKSC 3
5 For further discussions of the Supreme Court case see Sheate (2017).

alternatives and provide the planners with the identification of the optimal option with the least environmental impacts.
The SEA was formulated according to the principles of sustainable development, which the SEA defined as the intersection between the economic, social and natural environments. However, looking at the available reporting, the SEA mainly assessed the consequences of the project on several natural environment related aspects, such as soil, landscape, biodiversity, surface waters, etc.
The assessment of those environmental impacts was limited to a 2 km wide strip of land (1km to both sides from the axis of each Option) (Sweco Lietuva UAB 2013) and began in 2012, taking into consideration the construction and operation stages of the project until the year 2025.

Results

A comparative analysis of the three cases was conducted using the adopted comparative assessment framework (see set of criteria listed in **Error! Reference source not found.**), and the strategic issues for HSR (see Table 4). Results achieved are indicated in Table 5 and discussed in the following section, in an attempt to answer the two research questions: how strategic was the SEA/SA, and what influence the assessments had on decision-making?

<Table 5>

Discussion

Based on the above comparative results of reviewing the three case studies with the proposed framework, it is relevant to discuss whether strategic issues were addressed and if the SEA has influenced the decision-making process.
The SEA of the RFAV project was not legally required because the European Directive had not been transposed to national legislation yet; it was therefore a voluntary process requested by RAVE, SA. The AoS of the HS2 was also voluntarily requested in order to ensure the project's sustainability and even though it was considered by the UK Government that HS2 did not require SEA, the AoS indicated that it sought to integrate the requirements of the Directive nonetheless. In the case of the Rail Baltica 2, the requirements of the EC Directive 2001/42/EC were incorporated in the national legislation of both Latvia and Lithuania and therefore the SEA was conducted within the legal framework. With one legally required and two voluntary SEA/SAs, were these three case studies strategically assessed?
The SEAs of both Rail Baltica 2 and RFAV were only carried out to assess the plan alternatives that had already been developed during the planning process. The object of assessment was therefore the plan already laid out alternatives, presented as plan proposals. This indicates a later start of the SEA and poor interaction and cooperation between the planning and the SEA processes, resulting in several missed opportunities for making strategic decisions that could lead to more sustainable outcomes. There was no room for strategic thinking and elaboration so, perhaps, an EIA would have been more adequate to the planners' purpose.

If the SEAs for the RFAV and Rail Baltica 2 had been developed to assess strategic options (instead of project route alternatives), when the planning process and decision-makers were still open for a strategic discussion, then perhaps a more strategic elaboration of the SEA would have been possible. On the other hand, the AoS for HS2 started with the development of the Phase 1 project's sustainability objectives and had a crucial role throughout the entire decision-making process by attempting to minimise its adverse impacts with a team made up of both AoS practitioners and the planners (HS2 Ltd). This allowed an iterative and participatory process that discussed the different design options of the proposed route. However, although the AoS assessed certain different route alignments at different design standards in order to decide on a preferred route, it did not assess the likely significant effects of strategic alternatives to the national high speed strategy (Sheate 2017). According to Sheate, the AoS for HS2 "was in too much of a hurry to get to the route alignment, rather than spend a little more time on getting the strategy right in the first place and wider consensus on the role high speed rail should play in the nation's transport policy" (Sheate, 2017: 212).

The scale of the three assessments is also worth discussing. The SEAs did not explicitly detail the scales applied, instead, from what is said in the reports analysed, they focused entirely on medium-term scales with periods of assessment between 13 and 23 years and mainly limiting the area of assessment to regions directly affected by the planned routes. However, for strategic assessment it is important to decide and accommodate multi-scaling approaches in SEA right from the beginning of the assessment. Due to the magnitude of infrastructures such as HSR, medium-term and regional scales do not fully encompass the cumulative impacts and the strategic issues involved (see European Commission, 2013).

Additionally, participation was also limited. It does seem to be present, to a large degree, in the AoS of the HS2 where a Reference Group was established which, along with other stakeholders, participated throughout the process and whose feedback was considered and resulted in changes in the plan's layout. However, the consultation did not provide all the information regarding the entire high speed rail strategy, i.e. for both Phases 1 *and* 2[6], which compromised the ability of stakeholders to engage effectively across the whole route and strategy.

The SEA of the Rail Baltica 2, on the other hand, carried out consultations with stakeholders, members of the public and affected municipalities in two separate occasions: in the beginning of the process so that their feedback was included in the SEA Report and after its publication to inquire about its quality. In the RFAV case, however, there was absolutely no participation which meant that the stakeholders concerns were not even considered in the SEA. In order to contribute to a strategic nature SEA, participation cannot be limited to consultations only, but instead it must focus also on discussions concerning strategic and environmental issues that involve stakeholders and interested members of the public in an inclusive way throughout the entire SEA process, particularly at an early stage.

The Strategic Reference Framework which, as mentioned, is a framework of strategic macro policies proposed by Partidário (2012) to contribute to a strategic nature SEA, was identified in the SEAs for the RFAV and the Rail Baltica 2. However, they focused more on existing plans and programmes that

[6] Phase 2 of HS2 is to be from West Midlands to Leeds and Manchester.

the project should integrate and/or be integrated into, particularly territorial planning documents, but missed considering long-term strategic macro-policies. On the other hand the AoS of the HS2 included the four objectives for sustainability established in the *UK Sustainable Development Strategy: Securing the Future* (HM Government 2005). Even so, all three cases failed to establish a solid SRF where strategic macropolicies were identified and actually used in the process as a referential for assessment.

In general, the case studies tend to focus more in making predictions about the future of the projects and the possible impacts of their actions, with a certain level of certainty, as opposed to establish a strategic pathway that can be prepared to solve problems in a sustainable way and help achieve the best desired scenario. The tools and techniques used in the case studies were predominantly deterministic, used to describe the environmental conditions and the possible effects on the environment of the plans' actions as opposed to tools and techniques that could provide an approach to deal with such complex systems and promote more strategic issues. These systems are associated with uncertainty that is important to acknowledge. Only the AoS of the HS2 mentioned uncertainty, and even so, it was related to the projections it developed concerning the future effects of the project. Additionally, because we are dealing with complex systems, a follow-up programme should not focus exclusively on environmental monitoring, but it should also deal with other uncertainties and provide guidelines to analyse governance and processes of action. None of the case studies presented such strategies for uncertainty.

It is also relevant to compare the case-studies in relation to the scope of assessment and the extent the HSR strategic issues identified in the literature (as indicated in Table 3) were addressed. The RFAV and Rail Baltica 2 case studies' view on sustainability consisted basically of addressing separately the environmental, social, and economic aspects, without integrating them into a holistic perspective.

The SEA of the RFAV mainly addressed biophysical aspects regarding the environmental impacts of the project and few strategic issues were identified. It considered that the RFAV would articulate with other transport infrastructures thus providing intermodality and would also promote modal shift and therefore reduce the impact of the transport sector in Portugal on climate change and air quality, in addition to a reduction in road accidents. However, instead of working to find a new alternative that could avoid certain negative impacts on the environment, namely on biodiversity, including sensitive areas and habitat fragmentation, the SEA merely identified the impacts and proposed mitigation measures.

On the other hand, the SEA for the Rail Baltica 2 considered the environmental and economic aspects as well as social aspects, particularly it addressed the sustainable development of regions and improvement of quality of life. The SEA acknowledges that a main objective for Lithuania is to reduce the socio-economic disparities of regions and maintain their peculiar features while promoting an even development of the country. It also recognises that, on the national scale, disparities in the development of regions lead to social problems and underused human capital in the long term (Sweco Lietuva UAB 2013). Therefore, the Rail Baltica transport corridor would help address this issue by attracting investments to the affected regions during the stages of construction and operation.

Additionally, the presence of the high speed rail would enable the development of related economic activities (i.e. tourism) and would become a competitive mode of transport. The SEA also focused on the fact that the project is international, connecting the markets of Western Europe and Northern Europe increasing its financial viability in the long term (Sweco Lietuva UAB 2013).
The AoS of the HS2 also addressed aspects regarding four sustainability objectives which were: Reducing greenhouse gas emissions and combating climate change; Natural resource protection and environmental enhancement; Creating sustainable communities; and Sustainable consumption and production. These objectives contemplate different strategic issues that mix environmental, social and economic aspects such as the reduction of greenhouse gas emissions due to the modal shift from road and air to rail, which the AoS predicted would happen (although estimates of the extent of this were later revised significantly downwards), the increase of accessibility by, among other factors, enhancing public transport interchange; the improvement on the rail network's resilience against extreme weather events; and others.

Conclusion

Since European high speed rail projects have major implications on the environment as well as on the affected communities' quality of life and on the economy of the countries, it is fair to acknowledge that using SEA to address strategic environmental and sustainability issues that arise with these mega projects is crucial.
The analysis and comparison of three European case studies enables some interesting conclusions. The AoS of the HS2 in the UK was the assessment with the most strategic perspective of the three cases considered (although there is much room for improvement) due to the nature of the AoS itself, which sought to integrate environmental and sustainability considerations early on and influence the route planning process in an iterative manner, with the enlarged participation of stakeholders as well as the affected public. But its focus was still on a specific route, and in fact in a specific part of that route. Surprisingly, because of the parliamentary consent process, the Supreme Court found that the HS2 proposal did not meet the screening requirements of the SEA Directive, and so SEA was not undertaken.
Although it follows the requirements for the SEA Directive, the SEA for the RFAV was not a legal requirement but a voluntary process required by the planners to assess two plan alternatives for the high speed rail layout that were already designed. There was no public participation and quite limited interaction with the decision-making process, basically considering environmental and economic concerns in its scope of assessment and merely identifying few strategic issues. The strategic nature of SEA in this case was absent.
The SEA for the Rail Baltica 2 was the only development within the legal requirements of the 2001/42 Directive. It assessed two final alternatives of the plan, yet, due to its results and the feedback of the consultations with stakeholders and affected public, changes were implemented in the plan, particularly the layout of one of the routes. Even so, the SEA mainly addressed environmental and

economic aspects with no room for uncertainty although it has considered social aspects with a certain level of strategy.

Both the RFAV and the Rail Baltica 2 would have benefitted more if the SEAs had been carried out earlier on with the definition of sustainability objectives and in close and iterative interaction with the planning process thus incrementing sustainability aims in every step of the decision-making process. An enlarged and inclusive participation throughout the entire process would allow integration of the stakeholders and public's concerns in the outcome of the PPP.

To answer our research questions: how strategic was the SEA/SA, and what influence did the assessments have on decision-making?

With the SEA processes of both RFAV and Rail Baltica 2, where the objective was to assess two route alternatives for the plan's layout, the results of both assessments were directed to a preferable alternative and merely provided guidelines on how to monitor its environmental impacts. The SEA of Rail Baltica 2 actually recommended a few changes which were later implemented in the plan. On the other hand, the AoS of HS2 had a crucial role in the plan since it was carried out from the very beginning of the Phase 1 planning process, implementing sustainability and environmental concerns throughout the entire process, from establishing sustainability objectives to choosing the options for the rail network layout. However, the AoS focused entirely in determining the route alignment instead of working on the broader strategy for HS2, both for Phases 1 and 2. It is fair to conclude that all three SEA/SA cases were very limited with respect to their strategic features.

It is also fair to conclude that, even though the assessments of the three cases in this study did influence the decision-making, they did not do so in a strategic manner. They basically helped the planning process with almost entirely project-level decisions instead of addressing important strategic issues before options were already undertaken. Furthermore, an SEA should have been developed before the development of any HSR project to address a bigger and more important question: is HSR really necessary and justifiable? In the cases of RFAV and HS2, the costs of the projects were higher than projected, resulting in public outrage who questioned the need and purpose of such infrastructures. An SEA would therefore be more beneficial if it was used to develop a high level strategic discussion around the HSR to address several strategic issues, thus ensuring the sustainability of the project and avoiding public controversy.

Overall it can be concluded that the outcome of an SEA strongly depends on the object of assessment and its entry point, which will also affect its interactive features and its capacity to influence decision-making. SEA needs to do more than only take environmental and possibly other sustainability aspects into consideration in PPP – it needs to create conditions for changing the priorities in PPP in a way that environmental and other sustainability aspects can be well integrated upfront of the PPP process. In addition the HSR strategic issues that could enable the integration of long term broader sustainability issues at early stages in view of preventing potential impacts, have hardly been addressed.

SEA is an instrument of assessment with great potential to integrate strategy in high levels of decision-making and it should not be used merely to assess environmental impacts of the PPPs. Instead it

should look at the bigger picture and, in this case, evaluate if benefits of HSR outweigh its costs and address issues related to the pursuit of sustainable development.

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Figures

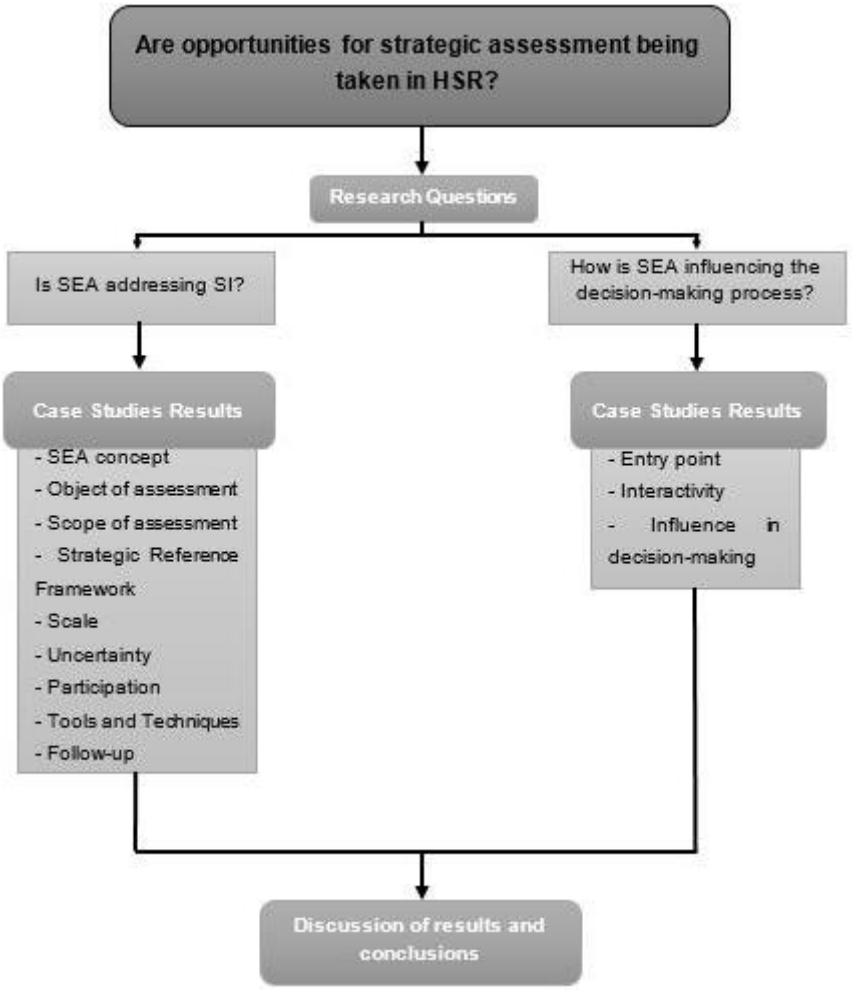


Figure 1 - Explanatory diagram of the methodology undertaken in the present paper

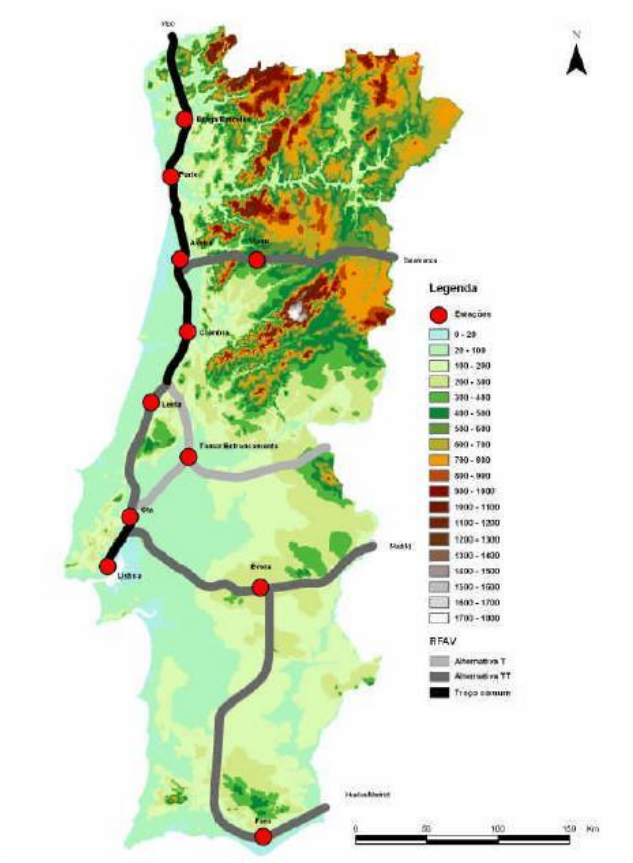


Figure 2 - General structure of the High Speed Rail Network in Portugal analysed in the SEA (Source: IDAD, 2003: 12)

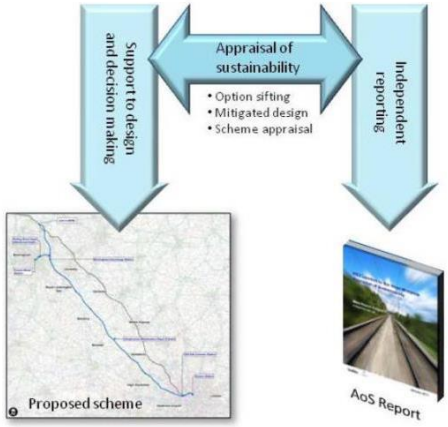


Figure 3 - Explanatory diagram of the role of AoS (Source: (Booz & Co. (UK) & Temple Group Ltd 2011b: 28)

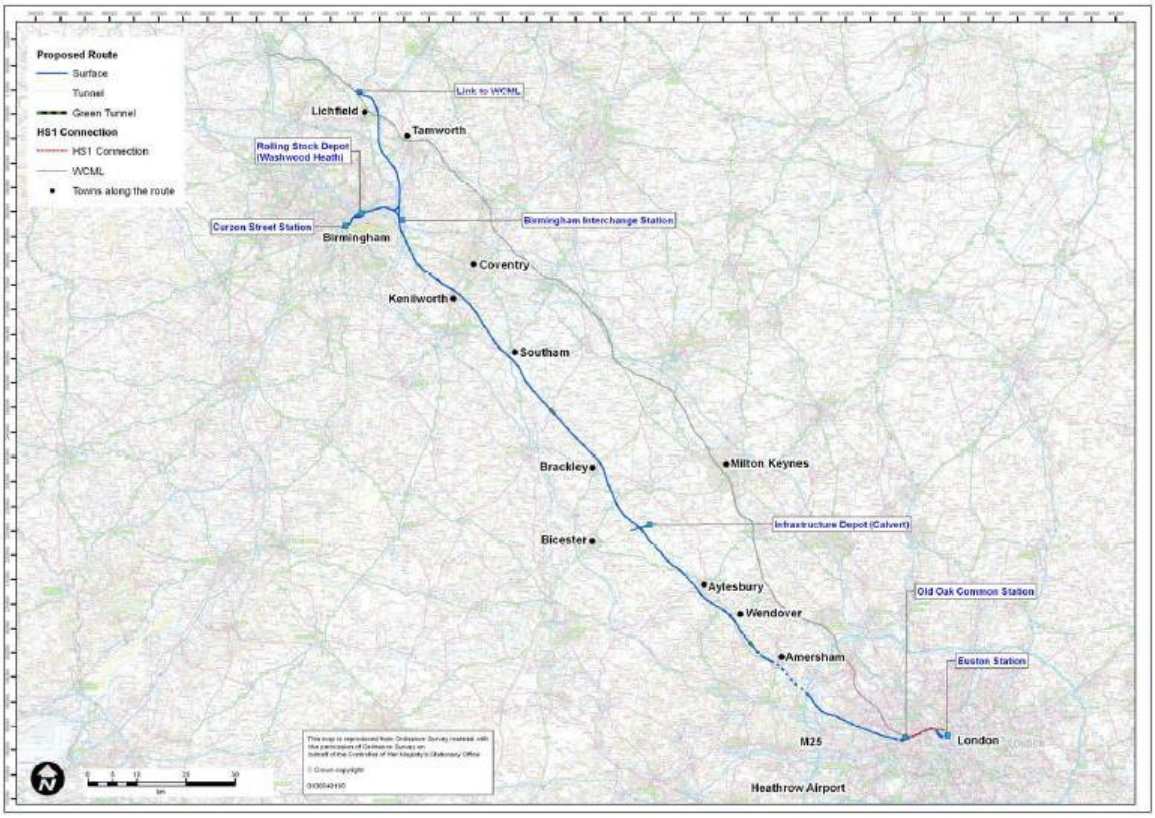


Figure 4 - The proposed scheme (Source: (Booz & Co. (UK) & Temple Group Ltd 2011b: 10)



Figure 5 - Territorial - administrative arrangement of the Options of Rail Baltica solutions (in the territories of the Republic of Lithuania, the Republic of Latvia, the Republic of Estonia) (Source: Sweco Lietuva UAB 2013a: 11)

Tables

Table 1 - Comparing SEA effectiveness assessment criteria, based on frameworks reviewed

		Collected frameworks of assessment						
		IAIA, 2002	Wang, Bai, Liu, & Xu, 2012	Zhang, Christensen, & Kørnøv, 2013	Partidário, 2012	Acharibasam & Noble, 2014	Hanna & Noble, 2015	Lobos & Partidário, 2014
Assessment criteria of proposed framework	SEA concept	✓						✓
	Object of assessment				✓			✓
	Entry point			✓	✓	✓		✓
	Legal foundation	✓	✓		✓	✓	✓	✓*
	Interactivity	✓		✓	✓		✓	✓
	Scope of assessment	✓			✓			✓
	Tools and techniques		✓	✓			✓	✓
	Uncertainty			✓			✓	✓
	Participation	✓		✓	✓	✓	✓	✓
	Follow-up			✓	✓	✓	✓	✓
	Outcome of assessment		✓			✓	✓	

* Lobos & Partidário (2014) refer to Strategic Reference Framework rather than Legal foundation.

Table 2 - Proposed framework for comparing case-studies in relation to the SEA strategic capacity (after Lobos and Partidario, 2014)

Assessment criteria	Key-question	Category
1. SEA concept	What was the purpose and role of SEA?	1. Delivering sustainable development at a strategic level 2. Validating the environmental quality of PPP proposals 3. Identifying and communicating the potential environmental consequences of PPP proposals
2. Object of assessment	What was assessed?	1. Strategic objectives 2. Strategic options 3. Proposed model 4. Scenarios 5. Alternatives 6. Measures or actions
3. Entry point	At what stage of planning did SEA start?	1. Visioning and establishment of strategic objectives 2. Scenario building 3. Choosing of strategic options 4. Specific development proposals
4. Strategic reference framework	How was the strategic reference framework defined and used?	1. Used in the assessment 2. Only identified 3. Ignored
5. Interactivity	What was the degree of integration and feedback between assessment and planning activities?	1. High 2. Medium 3. Low
6. Scope of assessment	What was the scope of assessment?	1. Holistic and integrated 2. Social + biophysical + economic + political 3. Physical and territorial
7. Scale	What was the temporal and spatial scale?	1. Short-term 2. Medium-term 3. Long-term 1. Regional 2. National 3. International
8. Tools and techniques	What kind of tools and techniques were prioritised during diagnosis and assessment?	1. Favoured tools to deal with uncertainty, complexity and value commitment 2. Favoured tools to deal with a deterministic (causal) approach
9. Uncertainty	Were uncertainties recognised explicitly and dealt with adequately?	1. Integrated into analysis 2. Only identified 3. Ignored
10. Participation	What was the degree of participation?	1. Enlarged and in an inclusive way 2. Strict legal fulfilment 3. Punctual 4. No participation
11. Follow-up	What was the focus of guidelines for follow-up?	1. Guidelines for governance, planning, and management 2. Only environmental impact monitoring

			3. No follow-up guidelines were designed
12.	**Influence on decision-making**	Did SEA influence the decision-making process?	1. Assessment influenced decision-making process 2. Assessment did not influence decision-making process

Table 3 – HSR relevant strategic issues

HSR strategic issue	**Description**
Social and economic competitiveness	Establishment of links between main political and economic European centres having positive impacts on employment, business and economic activities, tourism and others
Intermodality and accessibility	Assurance of accessibility to HSR services, which should not be developed at the expense of the existing transport services, but promoting mobility and coordination with other transport modes as well as a modal shift away from road transportation, resulting in less traffic congestion and fewer road accidents.
Safety and quality of service	Guarantee of passenger safety as HSR is considered the safest mode of transport that promotes reduction of road accidents by reducing its congestion. It needs to be an affordable and reliable service that decreases nuisance factors such as noise and vibration thus providing a comfortable journey to customers, and facilitating physical accessibility for disabled people.
Natural resources and risks	Reduction of the transport environmental footprint by providing a more energy efficient mode of transport that reduces GHG emissions and air pollution. Promotion of a modal shift to rail, away from more polluting modes, namely aviation and road, thus addressing the issues of climate change.
Biodiversity and nature conservation	Avoidance of the potential conflict with major biodiversity and nature conservation areas.
Regional development	Promotion of regional development at a national level decreasing the disparities between regions.
Spatial planning	Avoidance of conflicts with sensitive areas and highly populated areas due to the design of HSR routes.

Table 4 - Aspects of the proposed scheme of HS2

A redeveloped station at Euston serving both high speed and conventional speed (classic) services
A rail connection linking HS2 with the existing High Speed 1 Channel Tunnel Rail Link (HS1) line*
An interchange with Crossrail and other services at Old Oak Common allowing access to Heathrow, as well as connections to the West End, the City and Docklands areas of London
Provision to allow future connection to Heathrow directly off the high speed line
A new interchange station near Birmingham Airport
Depots at Washwood Heath (in Birmingham) for rolling stock and at Calvert (northeast of Bicester) for infrastructure maintenance
A spur into Birmingham alongside the existing Tamworth & Nuneaton line west of Water Orton, with a terminus at Curzon Street
A route which joins the West Coast Main Line (WCML) at a new junction north of Lichfield

*The link between HS2 and HS1 has been removed from the hybrid bill due to the resulting local impact. HS2 Ltd is currently exploring how and when such a link might be achieved.

Table 5 - Summary of the results of the comparative assessment of the three case studies

Assessment criteria	RFAV	HS2	Rail Baltica 2
SEA concept	Identify and communicate the potential environmental consequences of PPP proposals	Deliver sustainable development at a strategic level	Identify and communicate the potential environmental consequences of PPP proposals
Object of assessment	Alternatives	Alternatives	Alternatives
Entry point	Specific development proposals	Project sustainability objectives	Specific development proposals
Strategic reference framework	Only identified	Used in the assessment	Only identified
Interactivity	Low	High	Low
Scope of assessment	Physical and territorial	Holistic and integrated	Social + biophysical + economic
Scale	National Medium-term	Regional Medium-term	National Medium-term
Tools and techniques	Favoured tools to deal with a deterministic (causal) approach	Favoured tools to deal with a deterministic (causal) approach	Favoured tools to deal with a deterministic (causal) approach
Uncertainty	Ignored	Only identified	Ignored
Participation	No participation	Enlarged and in an inclusive way	Strict legal fulfilment
Follow-up	Only environmental impact monitoring	Only environmental impact monitoring	Only environmental impact monitoring
Influence on decision-making	Assessment influenced decision-making process	Assessment influenced decision-making process	Assessment influenced decision-making process