

# High speed rail comparative strategic assessments in EU member states

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### Abstract

The present dissertation explores to what extent opportunities for strategic level assessments have been taken in high speed rail network in Europe by determining if SEA has been addressing strategic issues and influencing the decision-making process in three different cases of high speed rail – 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. A literature review on the concept of SEA effectiveness was also made, along with a collection of frameworks that establish the criteria or factors that can be used to define it according to several authors. These frameworks are analysed to determine which criteria or factors are better aimed at answering the present dissertation's research questions which results in a proposed framework that intends to explain how environmental and sustainable assessments were undertaken in the three aforementioned European high speed rail case studies. It can be concluded that an SEA would be most beneficial if it were developed before the development of any HSR project to first determine if HSR is really necessary and justifiable, which did not happen in the three case studies, thus ensuring the sustainability of the project and avoiding public controversy. Even though the SEAs of the three cases in study did influence the decision-making, they did not do so in a strategic manner, merely helping the planning process with almost entirely project-level decisions instead of being used to develop a high level strategy for HSR that addresses several strategic issues before options were already undertaken.

**KEYWORDS:** Strategic Environmental Assessment, Appraisal of Sustainability, High Speed Rail, Strategic Issues, SEA effectiveness

### 1. Introduction

Thanks to transport systems, access and mobility have vastly improved which allowed the development of modern societies and economic growth. However, these transport activities come with negative impacts related to CO<sub>2</sub> emissions, accidents, land use and others. With many challenges arising, such as demographic development, urbanisation, the scarcity of natural resources, increases in oil and energy prices and increase in travel demand, there is a need for more efficient, sustainable solutions, one of which could be Rail, especially High Speed Rail (HSR) (Jehanno et al. 2011).

The European Union therefore believes that the rail network is the key to reinforce the economic and political cohesion of the Union by integrating peripheral regions in the longer term, thus being part of a global transport policy to improve territorial integration (Jehanno et al. 2011).

A European high speed rail network would be an infrastructure of such magnitude and with such repercussions on the environment, economy and population's lives that assessing its sustainability and

strategic issues is absolutely crucial. In order to do that, an instrument such as Strategic Environmental Assessment (SEA) is needed in order to support the decision-making process. Instead of an operational nature SEA which focuses on addressing environmental impacts at decision-making level, a strategic nature SEA would instead address more strategic issues thus allowing the integration of long term broader sustainability issues at early stages.

#### 1.1. Strategic Issues

It is therefore important to understand what makes a transport system such as HSR sustainable and what strategic issues should be addressed in the SEA. With these considerations in mind, it is possible to identify several strategic issues (SI) that should be addressed in order to ensure a strategic decision-making process that takes into consideration the broader idea of a European HSR network rather than only focusing on national HSR:

#### **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, promotion of mobility and coordination with other transport modes as well as a modal shift away from road resulting in fewer 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 that facilitates 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.

## **1.2. Objectives and methodology**

The main goal of this dissertation is to explore to what extent opportunities for strategic level assessments have been explored in high speed rail network in Europe. In order to do so, a comparative analysis of strategic level assessments is made regarding three different cases of high speed rail – 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. This analysis, using a common framework of comparison,

attempts to answer two research questions. Is SEA addressing strategic issues? How is SEA influencing the decision-making process?

In order to address these questions one needs to determine if there were only operational issues considered or there were strategic issues addressed as well and if the SEAs were useful for making a decision regarding the plans. Three different environmental and sustainability reports of high speed rail from EU members states were collected and analysed, these being:

- Portugal: Strategic environmental assessment of the high speed rail network;
- 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.

Lastly, a comparison of the three case studies was made with the established framework in order to answer the research questions and the results were thus analysed accordingly.

## **2. Strategic Environmental Assessment**

The research methodology is based on a state of the art review of the environmental and sustainability assessments in order to better understand the process of implementation of instruments such as Strategic Environmental Assessment (SEA) and Sustainability Appraisal (SA) to policies, plans and programs. Additionally, a review of literature on the concept of SEA effectiveness is made in order to understand the views of several authors on what characterises an effective SEA and what criteria or factors can be used to define it.

### **2.1. Purpose and benefits**

The purpose and aims of SEA change depending on the planning and decision-making context in which it is applied (Tetlow & Hanusch 2012). Nevertheless, Fischer (2007) states that the role of SEA is to take environmental and possibly other sustainability aspects into consideration in 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 behaviour and development, by following strategic thinking and constructive approaches” (Partidário 2015: 1). The author also states that SEA must incorporate environmental issues early on, integrating them in the strategic decision-making process and formulating and discussing strategic alternative options. Furthermore, if a truly 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).

## **2.2. Sustainability Appraisal**

It is relevant to mention the particular form of SEA named Sustainability Appraisal, because that was the other instrument used in one of the case studies beside SEA, namely in the HS2 London to the West Midlands. The UK Government has introduced the Planning Act 2008 in order to speed up the process for approving national significant infrastructure projects (NSIPs). Due to this process, the Government first introduced national policy statements (NPSs) which establish objectives and policies for matters of national significance. These require SEA, however, the Government uses a broader process named Appraisal of Sustainability (AoS) that addresses environmental aspects in addition to social and economic, ideally meeting the requirements of the SEA Directive (Sheate 2015). The author additionally explains that “the term Appraisals of Sustainability refers solely to those assessments undertaken for NPSs, though in all other respects they are the same as Sustainability Appraisals undertaken for spatial plans in the UK and need to be screened for applicability of the SEA Directive” (Sheate 2015: 2). The former Department

of the Environment, Transport and the Regions (DETR) defined sustainability appraisal (SA) as “a systematic and iterative process undertaken during the preparation of a plan or strategy, which identifies and reports on the extent to which the implementation of the plan or strategy would achieve the environmental, economic and social objectives by which sustainable development can be defined, in order that the performance of the strategy and policies is improved” (DETR 2000 cited in Smith & Sheate 2001). By taking into consideration all aspects of sustainable development, sustainability appraisal supports the decision-making process in a more integrated approach (Smith & Sheate 2001) whereas the SEA Directive focuses mostly on the environmental assessment.

## **2.3. SEA effectiveness**

The task of assessing the effectiveness of SEA is a difficult one (Sheate 2010). Initially it was perceived that an SEA was effective if it resulted in changes in the PPPs. However, as SEA evolved, the concept of effectiveness shifted to refer to the process of SEA itself (Tetlow & Hanusch 2012). However, in order to evaluate the effectiveness of SEA, one cannot solely consider its influence on the final decision but also its contribution throughout the decision-making process (van Doren et al. 2013) thus requiring a holistic approach (Wang et al. 2012). There have been increasing researches on SEA effectiveness through criteria-based assessment in the international professional literature (Wang et al. 2012; Fischer & Gazzola 2006). The IAIA (2002) established SEA performance criteria which state that the SEA process should be integrated, sustainability-led, focused, accountable, participative and iterative. van Buuren and Nooteboom (2009: 147) have defined three criteria to evaluate the effectiveness of an SEA:

- The SEA enables decision-making based on authoritative and undisputed information on the environmental consequences of each alternative choice (content);
- The SEA contributes to the inclusiveness of the collaborative dialogue, and thus to the realization of support and legitimacy by

achieving consensus and frame-reflection (process);

- As a procedural device, SEA contributes to the timeliness, transparency, and quality of the overall decision-making process (procedure).

Hanna and Noble (2015) conducted a study where the participants were asked to identify the four most important criteria themes that evaluate the effectiveness of IA, which are: stakeholder confidence, integrative and linked to decision-making, promotes long-term substantive gains in environmental quality and comprehensiveness. After reviewing the literature on the subject of SEA effectiveness criteria, Fischer and Gazzola (2006) summarised that an ideally effective SEA should relate to objective-led, efficient, relevant, accountable, transparent, iterative, adaptive, flexible, integrated and sustainable decision making. Although, it is unlikely that all these criteria could be equally delivered due to eventual SEA constraints such as budget, time, resources, etc.

### 3. Development of an assessment framework for effectiveness

After reviewing the literature on the subject of SEA effectiveness, it is possible to proceed to the analysis of the existing frameworks of assessment in order to propose a framework that can evaluate whether or not strategic issues were addressed in the case studies and if SEA has influenced their decision-making process. After reviewing the collected frameworks of assessment of SEA effectiveness one must first look into the criteria that were mentioned by most authors, meaning that these were generally agreed upon criteria for SEA effectiveness which were Public Participation, Entry Point and the Timing, Interactivity, Legal foundation/requirements, Scope of Assessment, Tools and Techniques, Uncertainty, Monitoring and Follow-up and Outcome of SEA. However, Lobos and Partidário (2014) believe that,

to better evaluate the effectiveness of strategic-thinking SEA and therefore allow to determine to what extent strategic issues were addressed in the assessment of the three case studies, other criteria should also be addressed such as:

- **SEA concept:** By knowing the concept practitioners attribute to SEA one can understand the role it plays in a strategic assessment process (Lobos & Partidário 2014).
- **Object of assessment:** It identifies what is going to be assessed (Partidário 2012) which is important to understand, because if the object of assessment were the planning objectives and defined strategic options then there would be no involvement of the SEA in the formulation of options which means the SEA wouldn't have the capacity to influence the decision-making process nor the strategic direction of PPPs (Lobos & Partidário 2014).
- **Strategic Reference Framework:** It is a framework of strategic macro policies of the SEA, as a critical factor of SEA effectiveness. This indicator sets the referential 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).

Having taken all the reviewed frameworks into consideration, it is believed that the framework of Lobos and Partidário (2014) better evaluates the effectiveness of a strategic-thinking SEA because it is broader, addressing all the criteria listed in Table 1 referenced by several of the reviewed authors, while also incorporating other criteria such as SEA concept, object of assessment and SRF that can better assess whether or not strategy was included in the assessment.

Table 1 - Common criteria between collected frameworks and the proposed framework of SEA effectiveness assessment

		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	✓	✓		✓	✓	✓	✓ <sup>1</sup>
	Interactivity	✓		✓	✓		✓	✓
	Scope of assessment	✓			✓			✓
	Tools and techniques		✓	✓			✓	✓
	Uncertainty			✓			✓	✓
	Participation	✓		✓	✓	✓	✓	✓
	Follow-up			✓	✓	✓	✓	✓
	Outcome of assessment		✓			✓	✓	

### 3.1. Proposed Framework

The proposed framework is almost entirely based on the framework established by Lobos and Partidário (2014), however, in order to address the present dissertation's research questions, two other criteria should be included, which are scale and influence on decision-making. **Scale** is a relevant criterion because during impact assessment wide ranging temporal and spatial scales (long-term to short-term temporal scale; global to site-specific spatial scale) can be involved in the process which can difficult the identification of the problem if the right scale(s) are not used (Partidário 2007). **Influence on decision-making** is also a relevant criterion that helps determine if opportunities for strategic assessment were taken by determining if SEA had, in fact, a role in the decision-making process. As a result, a framework for SEA effectiveness is developed in Table 2.

### 4. Case studies results

With the established assessment framework for SEA effectiveness one can proceed to analyse each of the three case studies of high speed rail against the proposed set of criteria listed in Table 2 in order to obtain the results whose analysis will allow to answer the research questions defined in this dissertation.

### 5. Discussion of results

The SEAs of both Rail Baltica 2 and RFAV were only carried out to assess the plan alternatives that were already developed during the planning process, which translates into a poor interaction and cooperation between the planning team and the SEA practitioners, resulting in several missed opportunities for making strategic decisions that could lead to a sustainable process. Granted, because the SEAs carried out for the RFAV and Rail Baltica 2 were intended to address a plan, particularly already laid out alternatives, there was no room for strategy so, perhaps, EIAs were more actually adequate to the planners' purpose. Therefore it can be concluded that an SEA strongly depends on the

<sup>1</sup> Lobos & Partidário (2014) refer to Strategic Reference Framework rather than Legal foundation.

Table 2 - Proposed framework of SEA effectiveness assessment

Assessment criteria	Key-question	Category		
1. <b>SEA concept</b>	What was the purpose and role of SEA?	<ol style="list-style-type: none"> <li>Delivering sustainable development at a strategic level</li> <li>Validating the environmental quality of PPP proposals</li> <li>Identifying and communicating the potential environmental consequences of PPP proposals</li> </ol>		
2. <b>Object of assessment</b>	What was assessed?	<ol style="list-style-type: none"> <li>Strategic objectives</li> <li>Strategic options</li> <li>Proposed model</li> <li>Scenarios</li> <li>Alternatives</li> <li>Measures or actions</li> </ol>		
3. <b>Entry point</b>	At what stage of planning did SEA start?	<ol style="list-style-type: none"> <li>Visioning and establishment of strategic objectives</li> <li>Scenario building</li> <li>Choosing of strategic options</li> <li>Specific development proposals</li> </ol>		
4. <b>Strategic reference framework</b>	How was the strategic reference framework defined and used?	<ol style="list-style-type: none"> <li>Used in the assessment</li> <li>Only identified</li> <li>Ignored</li> </ol>		
5. <b>Interactivity</b>	What was the degree of integration and feedback between assessment and planning activities?	<ol style="list-style-type: none"> <li>High</li> <li>Medium</li> <li>Low</li> </ol>		
6. <b>Scope of assessment</b>	What was the scope of assessment?	<ol style="list-style-type: none"> <li>Holistic and integrated</li> <li>Social + biophysical + economic + political</li> <li>Physical and territorial</li> </ol>		
7. <b>Scale</b>	What was the temporal and spatial scale?	<table border="0"> <tr> <td> <ol style="list-style-type: none"> <li>Short-term</li> <li>Medium-term</li> <li>Long-term</li> </ol> </td> <td> <ol style="list-style-type: none"> <li>Regional</li> <li>National</li> <li>International</li> </ol> </td> </tr> </table>	<ol style="list-style-type: none"> <li>Short-term</li> <li>Medium-term</li> <li>Long-term</li> </ol>	<ol style="list-style-type: none"> <li>Regional</li> <li>National</li> <li>International</li> </ol>
<ol style="list-style-type: none"> <li>Short-term</li> <li>Medium-term</li> <li>Long-term</li> </ol>	<ol style="list-style-type: none"> <li>Regional</li> <li>National</li> <li>International</li> </ol>			
8. <b>Tools and techniques</b>	What kind of tools and techniques were prioritised during diagnosis and assessment?	<ol style="list-style-type: none"> <li>Favoured tools to deal with uncertainty, complexity and value commitment</li> <li>Favoured tools to deal with a deterministic (causal) approach</li> </ol>		
9. <b>Uncertainty</b>	Were uncertainties recognised explicitly and dealt with adequately?	<ol style="list-style-type: none"> <li>Integrated into analysis</li> <li>Only identified</li> <li>Ignored</li> </ol>		
10. <b>Participation</b>	What was the degree of participation?	<ol style="list-style-type: none"> <li>Enlarged and in an inclusive way</li> <li>Strict legal fulfilment</li> <li>Punctual</li> <li>No participation</li> </ol>		
11. <b>Follow-up</b>	What was the focus of guidelines for follow-up?	<ol style="list-style-type: none"> <li>Guidelines for governance, planning, and management</li> <li>Only environmental impact monitoring</li> <li>No follow-up guidelines were designed</li> </ol>		
12. <b>Influence on decision-making</b>	Did SEA influence the decision-making process?	<ol style="list-style-type: none"> <li>Assessment influenced decision-making process</li> <li>Assessment did not influence decision-making process</li> </ol>		

object of assessment, which means that the SEAs for the RFAV and Rail Baltica 2 should have been developed to assess options when they were still open during the strategy development in order to consequently partake a more strategic nature. On the other hand, the AoS for HS2 has indeed started with the development of the 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 with both AoS practitioners and the planners (HS2 Ltd) which allowed an iterative and participatory process that discussed the different design options. However, although the AoS assessed 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 2015). 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 of high speed rail should play in the nation's transport policy" (Sheate 2015: 14). The scale of the three assessments is also worth discussing. The SEAs did not explicitly detailed the scales applied to the case studies but from what it said in the reports analysed, they focused entirely in medium-term scales with periods of assessment between 13 and 23 years and mainly limited the area of assessment to regions directly affected by the planned routes. Therefore, it is important to evaluate the scales to be used in SEA in the beginning of the assessment, because due to the magnitude of infrastructures such as HSR, medium-term and regional scales do not fully encompass its cumulative impacts and the strategic issues that arise from them. Additionally, participation does seem to be of a large degree in the AoS of the HS2 where a Reference Group was established that, 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. both Phases 1 and 2, which led to an

uninformed feedback of the public. 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 considered in the SEA. In order to contribute to a strategic nature SEA, participation cannot be limited to only consultations, focusing also in 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 is a framework of strategic macro policies that would therefore contribute to a strategic nature SEA was merely identified on the SEAs for the RFAV and the Rail Baltica 2 and yet, they focused more on existing plans and programmes that the project should integrate and/or be integrated into, particularly territorial planning documents, as opposed to long-term strategic macro-policies. The AoS of the HS2 has actually included in its assessment the four objects for sustainable 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 integrated in the process as referential for assessment. The RFAV and Rail Baltica 2 case studies' view on sustainability consisted basically on addressing environmental, social, and economic aspects without integrating them into a holistic perspective where, along with the integration of institutional aspects, strategic issues could be addressed and the origin of problems identified. 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 avoids certain negative impacts on the environment, namely on biodiversity with affectation of 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 aside from the environmental and economic aspects also addresses social aspects, particularly 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 maintaining 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 addresses 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 address different strategic issues apart from the 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, the

increase of accessibility by, among other factors, enhancing public transport interchange; the improvement on the rail network's resilience against extreme weather events; etc. In fact, the case studies generally 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 plan to solve problems in a sustainable way and help achieve the best future scenario. The techniques and tools 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 whereas *T&Ts* that could provide with an approach to deal with such complex systems and promote a more strategic SEA. 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 entirely on environmental monitoring, but also on dealing with such uncertainty and providing guidelines to analyse governance and processes of action, which did not happen in either of the three case studies. With the SEA processes of both RFAV and Rail Baltica 2, in which the objective was to assess two alternatives for the plan's layout, the results of both assessments indicated which would be the preferable alternative and merely provided guidelines on how to monitor its environmental impacts. The SEA of Rail Baltica 2 actually recommended a few alterations which were later implemented in the plan. On the other hand, the AoS of HS2 had actually a crucial role in the plan because it was carried out since the very beginning of the planning process implementing sustainability and environmental concerns throughout the entire process of establishing sustainability objectives and 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.



Table 3 - Summary of the results of the assessment framework for the three case studies

Assessment criteria	Portugal	UK	Lithuania
SEA concept	Identifying and communicating the potential environmental consequences of PPP proposals	Delivering sustainable development at a strategic level	Identifying and communicating the potential environmental consequences of PPP proposals
Object of assessment	Alternatives	Alternatives	Alternatives
Entry point	Specific development proposals	Specific development proposals	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

## 6. Conclusions

Since European high speed rail projects have major implications not only on the environment but also on the affected communities' quality of life, the economy of the countries as well as sustainability issues that come from being a part of an integrated European transport network, using SEA to address strategic issues that arise with projects of this magnitude is crucial. However, when analysing three European case studies one can conclude that, even though the SEAs of the three cases in study did influence the decision-making, they did not do so in a strategic

manner, merely helping the planning process with almost entirely project-level decisions instead of addressing important strategic issues before options were already undertaken. Both the RFAV and the Rail Baltica 2 would benefit more if the SEAs were 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 permit the integration of the stakeholders and public's concerns in the outcome of the PPP. 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 strategy for HSR that addresses several strategic issues thus ensuring the sustainability of the project and avoiding public controversy. 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 but to look at the bigger picture and evaluate if benefits of HSR outweigh its costs and address issues related to the pursuit of sustainable development.

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