Incorporating climate change mitigation and adaptation into environmental impact assessment: a review of current practice within transport projects in England

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Climate change has emerged as a key environmental issue in the past decade, with growing attention focussed on mitigating and adapting to its potential effects. As Environmental Impact Assessment (EIA) is a well-established and legally required environmental decision-making tool for certain project types in most countries (Glasson et al 2012; Yi & Hacking 2012), it can potentially play a key role in assisting efforts to minimise greenhouse gas emissions and adapt to the changing climate (Institute of Environmental Management and Assessment (IEMA) 2015a).

Climate change is not explicitly included in the formal requirements of the European EIA Directive (2011/92/EU); 'climatic factors' are listed along with soil, water, air and landscape as a factor that should be assessed. For this reason, along with issues of availability of historical climate information and uncertainty in climate predictions, it is therefore not currently common practice to explore climate change in the EIA for the majority of project types (Chang & Wu 2013). Currently, the consideration of climate-related impacts is typically limited to assessments of flood risk, carbon dioxide and greenhouse gas emissions. Revisions to the EU Directive (2014/52/EU), to be transposed by 16 May 2017, state the need to explore '*the impact of the project on climate and the vulnerability of the project to climate change'* (annex IV 5. (f)), confirming the need to consider climate change at greater detail and specificity than current practice.

Various guidance documents exist on integrating climate change into EIA both in the UK and internationally however guidelines providing specific advice on accounting for climate change mitigation and adaptation are lacking. Despite this, climate change is beginning to be considered in a small number of EIAs.

As the consideration of climate change is a new inclusion in EIA and there is a requirement for guidelines for accounting for climate mitigation and adaption, this paper assesses the quality of current inclusion of climate mitigation and adaptation in UK Environmental Statements (ESs) in order to evaluate current practice and suggest recommendations moving forward. This has been achieved through the development of a specific climate change mitigation and adaptation review method, incorporating criteria-based review approaches adapted from existing methods and wider literature and involving input from environmental professionals. Review methods for EIA evaluation and quality assurance have been adopted by many studies (Jay et al 2007; Briggs & Hudson 2013) due to their effectiveness at assessing specific aims.

The review criteria (outlined in Table 1) was derived from an audit of 50 environmental statements, literature review and interviews with EIA professionals to identify the current knowledge gap of climate change mitigation and adaptation in EIA. Each question was graded from A-E against criteria specific to each question. For example, an A grade was awarded where the question was addressed in comprehensive detail; at the other end of the scale, a D grade was given for minimal consideration and an E grade for no consideration at all. The criteria was applied to a sample of ten UK transport ESs that considered climate change. As transport projects are highly vulnerable to the effects of

climate change (Eisenack et al 2012), such projects would benefit from effective consideration of climate change mitigation and adaptation.

Table 1. The review criteria questions

Question
3.1. Is a justification given for the need for mitigation in the policy (3.1.1), development (3.1.2) and climate change (3.1.3) contexts?
3.2. Is a justification given for the chosen mitigation?
3.3. How detailed is the description of the mitigation measure?
3.4. Is the effectiveness or benefits of the chosen mitigation stated?
3.5. Is there evidence of commitment to implementing the mitigation?
3.6. Is there evidence of measuring or monitoring the success of the mitigation measures?

The application of the review criteria (Table 2) found that justifications relating to climate policy, climate science, the effect of climate change on the development, and its vulnerability to climate risks were well explained in most projects. As outlined in Table 1, many projects lacked detail of climate change mitigation and adaptation measures and their benefits, whilst evidence of commitment to mitigation and adaptation or to post-decision monitoring was poor or non-existent.

Table 2. An overview of the grades allocated for each individual project and question. Green represents a good quality answer, yellow an average answer and red an unsatisfactory answer.

Project/Question	3.1.1 Justification: policy context	3.1.2 Justification: development context	3.1.3 Justification: climate change context	3.2 Justification for mitigation	3.3 Detail of mitigation	3.4 Effectiveness or benefits stated	3.5 Evidence of commitment	3.6 Measuring/ monitoring
Northern Line Extension	A	A	A	B	C	D	D	C
High Speed 2	A	A	B	A	C	C	D	E
Leeds NGT	A	A	A	B	C	B	C	D
North Doncaster Chord	A	A	B	B	C	D	B	D
Mersey Gateway	A	C	D	C	B	C	D	B
M1 Junction Improvement	A	A	A	B	B	C	C	D
London Luton Airport	B	A	E	C	C	C	B	D
Northern Distributor Road, Norwich	A	A	A	B	C	A	D	D
Birmingham International Airport	B	A	B	B	B	D	D	D
London Ashford Airport	B	B	B	C	C	D	D	E

From Table 2 it is evident that currently lacking in ESs is commitment to implementing climate mitigation and adaptation measures and to post-decision measuring or monitoring. Reasons for the neglect of post-auditing include the cost and time of monitoring, the absence of mandatory or

auditable requirements and a lack of appropriate legislation (Jones & Fischer 2016). Fundamental to EIA practice is incorporating explicit requirements into legislative frameworks (Jay et al 2007) however the requirement for post-decision auditing is not explicit in the current EIA regulations. Revisions to the Directive (2014/52/EU) move towards a clearer requirement for monitoring and commitment, by stipulating that Member States shall implement mitigation measures and subsequent monitoring procedures for significant adverse effects (Article 8a (4)).

When reviewing the case studies, many chapters contained inexplicit climate mitigation and adaptation. Following consultation with EIA professionals, it was explained that whilst mitigation or adaptation measures may relate to climate change, in order to keep ES chapters consistent and focused, it is not necessary to cross-reference them to other impacts. This highlights the need for a holistic consideration of climate change within EIA due to its interference with many environmental disciplines. The challenge, similar to that of post-auditing, is the nature of EIA as a methodological and process-based tool. Morrison and Retief (2012) suggest that rather than legislative reform or change in the EIA process, a bigger change can stem from the behaviour of individual professionals, recognising that climate change should be considered holistically and as an integrative part of the EIA.

Given the regulation amendments and increasing concern over how to consider climate change in EIA, it is important to address whether EIA is a good platform to evaluate climate change. Including climate concerns in EIA only accounts for climate change impacts from new developments required to undertake EIA. This excludes climate impacts from ongoing activities and from new developments not requiring an EIA. Small proportions of planning applications include an environmental impact assessment with only 0.1% of Environmental Statements submitted for over 450,000 planning applications between April 2014 and March 2015 (IEMA, 2015b). Therefore, the impacts mitigated or adapted to within new developments compared to those from existing developments will be very small. Additionally, as EIA primarily identifies the impact of a project on the environment rather than the impact of environmental change, EIA may not fully evaluate climate change (Agrawala et al., 2012).

It has been questioned if EIA is as effective as its originators expected (Cashmore et al., 2004) and if it offers more in theory than in practice (Lawrence, 1997). This concurs with the findings of this study, which demonstrate that climate change is only included in ESs following the requirements of the EIA Directive, with the absence of best practice commitment, post-auditing and explicit inclusion of climate change. It appears that currently, EIA is not a platform fit to address climate change for three main reasons (Jay et al., 2007; Morrison-Saunders & Retief, 2012; Chang & Wu, 2013):

(1) To date, climate change is yet to be required by EU legislation (but will be when the 2014 Directive is implemented);
(2) There is a lack of guidance and understanding of how climate change should be included in UK EIA assessments; and,
(3) Current practice in EIA is to achieve development consent with lesser focus on the post-EIA impacts and sustainability of the project.

As the 2014 Directive amendment comes into force, points (2) and (3) need to be addressed in symbiosis. On asking practitioners how they included climate change when producing an ES, P6 stated they "*used a variety of information and informal guides available as not one source was solely appropriate*". This statement, along with the low grades allocated to the last few questions in the criteria proves the current disjointed nature of including climate change and the need for guidelines.

IEMA and engineering consultancy Mott Macdonald have produced guidance on climate change adaptation and resilience in EIA (IEMA and Mott MacDonald 2015). This guidance outlines how to build climate resilience into project design and the aspects of climate change reporting that should be featured in the ES. It provides a seven step approach to considering climate change adaptation in EIA, beginning with scoping and defining the emerging baseline to identifying climate change vulnerability in combination with assessment and concluding with developing a climate change action plan and monitoring and adaptive management. Additionally, the EC have an extensive guide on integrating climate change and biodiversity into EIA. This shows there will no longer be an absence of guidance for including climate change however their application by professionals is uncertain. This suggests that the issue may not be the inclusion of climate change but how it is embraced by individual professionals. Other elements of EIA have gone through similar transitions, with, for example the UK's Chartered Institute for Ecological and Environmental Management Guidelines pushing forward better practice in ecological assessment (Briggs and Hudson 2013). Including climate change in EIA will be a new but necessary challenge for professionals.

With some caveats based on the examination of a sample of projects from one sector, this study has suggested that EIA is not currently a good platform to consider climate change; however for its successful integration, it is recommended that stronger links between the EIA process and continual environmental management are needed through a more holistic consideration of climate change and more explicit use of sustainability terms. The update of guidelines for integrating climate change mitigation and adaptation are required in the UK along with the enhancement of the competence of practitioners through a change in their behaviour and attitudes from viewing EIA less as a systematic process but rather as an integrative process. Finally, an additional challenge will be adapting the EIA framework to consider climate change successfully and sustainably given the conventional nature of EIA practice.

Including climate change in EIA should not be seen in isolation as a solution to mitigating or adapting to climate change as only small proportions of new developments require an EIA and the climate impacts from ongoing activities are excluded. In addition, including climate concerns in EIA only accounts for climate change impacts from new developments required to undertake EIA. This excludes climate impacts from ongoing activities and from new developments not requiring an EIA.

Future research should investigate how to consider climate change impacts from existing developments and activities and should evaluate the lessons learnt from integrating climate change into EIA. In addition, further review is recommended once the parameters of Brexit and its implications on EIA legislation are made clear.

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