

Review of greenhouse gas emissions in SEA and EIA processes

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1 Executive summary

1.1 Introduction and background

The implementation of the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 has set a new climate change target for reducing emissions that aims to bring Scotland's emissions to net-zero by 2045. Achieving this target will require a sound understanding of likely greenhouse gas (GHG) emissions (or reductions) arising from national, strategic and project level decision-making.

The requirement to consider the impacts of a plan, programme or strategy (PPS) or proposed development on GHG emissions is captured as part of a wider assessment under the Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) regimes where relevant. This research seeks to review current practice in considering greenhouse gas (GHG) emissions as part of these processes, focusing in particular on:

- methodologies used to assess GHG emissions impacts;
- the level of detail included in these assessments; and
- how these emissions are reported and communicated.

The project also records observations on the effectiveness of the approaches taken to reporting and communicating these findings.

1.2 Overview of methodology

The research was based on:

- a review of relevant guidance;
- stakeholder engagement; and

- review and analysis of ten SEA and ten EIA case studies against an agreed set of criteria.

1.3 Key findings

SEA

For SEA the three guidance documents reviewed support identifying all types of GHG emissions and the sources of these. Two of these documents suggest using quantitative baseline information to inform the assessment. A third document (SEPA guidance) sets out examples of SEA climatic factors objectives and assessment questions, and these steer towards a qualitative approach. The assessment should then determine the overall effect of the PPS in order to evaluate the significance of the effects. The guidance documents support the need to clearly define significance for each environmental topic.

We reviewed ten Environmental Reports prepared between 2015 and 2020 for the SEA case studies. The case studies included local development plans, local authority level plans and strategies for climate change, renewable energy, transport, woodland, a sub-local tourism strategy, and two national level case studies covering climate change and a circular economy. Based on this review we identified that:

- The environmental baseline information included a range of data relevant to GHG emissions.
- An overlap between topic areas as part of the SEA process often results in information relevant to GHG emissions being considered and reported under other SEA topic headings but not being explicitly used to inform the assessment of GHG emissions impact (and not captured under the associated SEA heading of 'climatic factors'). As a result GHG emissions are not comprehensively reflected in a single specific area of the assessment process.
- Reporting under a single SEA heading of 'climatic factors' results in a lack of distinction between reporting of impacts on reducing GHG emissions (mitigation) and actions to adapt to the effects of climate change (adaptation).
- The majority of the Environmental Reports did not clearly set out the basis for considering the significance of the impact on climatic factors, for example whether significance was related to the baseline, local or national targets.
- The case studies did not use specific tools (for example carbon calculators) to assess GHG emissions; instead assessment approaches adopt a qualitative approach that use the SEA scoring system¹ and associated descriptive text, and indicate a direction of travel in GHG emissions (e.g. increase or decrease).

Stakeholder feedback also suggested that sometimes the scale of the available GHG data available doesn't relate closely to the scale of the associated PPS. This can compromise the ability to accurately determine or monitor the GHG emissions impact as a result of the PPS.

EIA

For EIA the key guidance is the Institute of Environmental Management and Assessment (IEMA)'s EIA Guide to Assessing Greenhouse Gas Emissions. This recommends that direct, indirect and embodied GHG emissions generated by the project/site should be considered at all stages of the project lifecycle. The document highlights several alternative methods to assess GHG emissions within the EIA process. However, there is a strong emphasis on the measurability of the emissions and the quantification of them.

¹ Approaches to SEA scoring to reflect significance of effects tend to range from significance positive (++) to significant negative (--). Approaches can also reflect neutral or mixed effects.

The guidance also suggests that the assessment should be proportionate, in that it should focus on significant impacts, and reflect the level of project information and scientific evidence available.

We reviewed ten Environmental Impact Assessment Reports (EIA-R) or equivalent, prepared between 2009 and 2019. The case studies cover a wide range of projects across a number of different consenting regimes and include wind farm developments, road construction, mining, forestry, marine infrastructure, mixed use and a recreational development². Based on this review we identified that:

- Although the case studies were intentionally selected because they contained some level of assessment of GHG emissions, the majority (eight out of ten) did not provide baseline data on GHG emissions. In line with IEMA guidance, some case studies provided justification for this by stating that the baseline is considered to be 'nil' as the site is currently undeveloped, meaning that there are no associated emissions.
- Two of the case studies included GHG emissions data at a national level, reflecting the wider impacts of the developments beyond the site boundary.
- The majority of the case studies (seven out of ten) included quantified assessment information for the construction phase of the development, commonly covering direct, indirect and embodied emissions. These examples often include the quantification of emissions such as embodied carbon within construction materials, the associated transport emissions from construction material delivery and onsite plant fuel usage.
- Six of the ten case studies included some degree of quantification of operational GHG emissions. Only four of these fully covered direct, indirect and embodied emissions.
- Despite the guidance advocating a life-cycle approach, the assessment of GHG emissions at the decommissioning phase is the least well documented. This is often scoped out on the justification that the emissions cannot be accurately predicted due to the lifespan of the project.
- The majority of the case studies reviewed employed some form of tool as part of the assessment. Most commonly such an approach was used to record either embodied GHG emissions in the required construction materials or GHG emissions associated with transport movements.
- Inclusion of quantified GHG emissions data is more likely where relevant quantified information is already available for the project (e.g. material quantities or vehicle movements) that can be used to determine corresponding GHG emissions.
- The approach to determining the level of significance of the GHG emissions arising from a project varies. In eight of the case studies a lack of baseline data prevented this being used as the basis for determining impact significance. A lack of regional or local GHG emissions targets also means that there are no meaningful benchmarks against which to judge significance.
- Where GHG emissions data is provided this is often clearly communicated, with the 'payback'³ approach often adopted for wind farms as an example.

Engagement undertaken with EIA practitioners to inform this research highlighted the challenges in quantifying GHG emissions at an early stage of project development, prior to the detailed design work being undertaken. This commonly only happens after a

² The mixed use and recreational developments were English examples. This because whilst these types of developments are considered very relevant in considering the capture of data on GHG emissions at the project level in Scotland, no suitable Scottish EIA examples could be identified. The findings of English EIAs are presented in Environmental Statements (ESs), as are Scottish EIAs prepared under earlier EIA Regulations. One non-EIA example is also included, where the GHG emissions assessment is included in an Environmental Report.

³ Carbon payback reflect the length of time that something would need to be in operation before it has an overall positive contribution. This takes account of the losses and gains in emissions associated with the development.

project has been consented and there is more certainty that it will proceed to construction, accepting that the EIA Regulations do accommodate multi-stage decision-making processes, where these exist to establish the acceptability of a proposal before developing detailed proposals.

1.4 Future implications of wider policy and practice

The SEA case studies highlight that significant effort is put into the qualitative assessment of GHG emissions in SEA. However, there is scope for the various elements of the assessment process (baseline, assessment questions, definition of significance and monitoring) to be joined up more comprehensively. The qualitative nature of the plans, policies and strategies being assessed defines the approach to the assessment of GHG emissions.

There is evidence of good practice with respect to the quantification of greenhouse gases in EIA from the case studies. Some of these examples have used supporting tools which could be more widely applied. The express consideration of greenhouse gases in EIA only became a formal requirement in 2017. EIA practitioners are also continuing to gain more experience in the assessment of GHG emissions impacts.

The declaration of a climate emergency, commitment to achieving net zero emissions and local authority level actions being taken to respond to this, is likely to lead to an increase in i) the collection of relevant data, ii) co-ordination of existing data, which could inform these assessment processes, and iii) expertise and engagement of decision makers and consultees in SEA and EIA scoping and development.

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2 Introduction

2.1 Project aims

This project seeks to review current practice in considering greenhouse gas (GHG) emissions as part of the Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) processes, focusing in particular on:

- methodologies used to assess GHG emissions impacts;
- the level of detail included in these assessments; and
- how these emissions are reported and communicated.

The project also records observations on the effectiveness of the approaches taken to reporting and communicating these findings.

2.2 Project context

On 31st October 2019, the Climate Change (Emissions Reduction Targets) (Scotland) Bill received Royal Assent. The Act strengthens Scotland's climate change targets for the reduction of emission levels from an 80% reduction by 2050 (as set out in the Climate Change (Scotland) Act 2009), to net-zero by 2045. The Act also sets out interim targets for 2030 and 2040, which represent the most ambitious statutory targets in the world for these years.

The Scottish Government has been consistently clear that emissions reductions targets must be credible, and both formulated and monitored using an evidence-based approach. This requires a sound understanding of likely GHG emissions (or reductions) arising as a consequence of decision-making from the national and strategic, through to project, levels.

The Scottish Parliament's Environment, Climate Change and Land Reform Committee completed Stage 2 scrutiny of the Climate Change (Emissions Reduction Targets) Bill in June 2019. During Stage 2 a number of amendments were debated, including Amendment 125 which would require that, at the same time as introducing a Bill to the Scottish Parliament or laying a Scottish statutory instrument before the Scottish Parliament, Ministers must lay before the Scottish Parliament a document estimating annual greenhouse gas emissions resulting from the Bill or Statutory Instrument, over the first five years, as well as its contribution to meeting our climate change targets.

During the debate, it was noted that a legislative requirement already exists and that rather than adding a further legislative requirement, it would be preferable to review the way in which SEA currently addresses climate issues, including reporting and communication of the impacts, building on guidance that the Scottish Environment Protection Agency (SEPA) has produced on consideration of climatic factors in Strategic Environmental Assessment⁴. This informed the scope and parameters of this study.

⁴ SEPA (2019) Guidance on consideration of climatic factors in Strategic Environmental Assessment

2.3 The role of Strategic Environmental Assessment

2.3.1 Introduction

SEA aims to ensure the likely significant environmental effects of relevant plans, programmes, and strategies (on a number of topics including air, water and soil quality, biodiversity, landscape and 'climatic factors'⁵) are taken into account at every stage in their preparation, implementation, monitoring and review. SEA therefore has the potential to play a significant role in promoting consideration of climate change and greenhouse gas emissions within Scottish public sector plan-making.

The legal requirement to undertake SEA (including the consideration of climatic factors) flows from the Environmental Assessment (Scotland) Act 2005⁶ ('the SEA Act'). The Act extends the application of SEA beyond the requirements of the associated EU Directive to cover all public plans, programmes and strategies (PPSs), subject to certain limited exemptions, where they are likely to lead to significant positive or negative environmental effects. Consequently, Scotland is unique within the UK and in Europe in both the volume and breadth of SEAs undertaken including at national level.

The SEA Act applies to PPSs prepared at the local level (e.g. Local Development Plans, woodland and forestry strategies) together with national policy (e.g. the Scottish Forestry Strategy, National Planning Framework etc.). The scale and topic coverage of the PPS in question has implications for the scale of likely effects on GHG emissions and the potential role of SEA in assessing the effects of different policy responses and options being set out in the PPS.

2.3.2 Considering greenhouse gas emissions in SEA

The SEA process needs to be undertaken in parallel with the preparation of a PPS. Consideration of climatic factors (i.e. impact on GHG emissions) needs to occur at all stages of the SEA (i.e. Screening, Scoping, Assessment, Adoption and Monitoring). SEPA has published guidance on the consideration of climatic factors within SEA⁷. The Scottish Government also published specific guidance for SEA practitioners in 2010⁸. These documents both provide helpful advice on the following parts of the SEA process, which gives an indication of the extent to which greenhouse gas emissions are considered under the SEA topic of 'climatic factors' are likely to be assessed and reported within the SEA Reports for different types of PPSs in Scotland.

2.4 The role of Environmental Impact Assessment

2.4.1 Introduction

Environmental Impact Assessment (EIA) is a process which identifies the likely significant environmental effects arising from a proposed project, including the scope to avoid, reduce and offset any adverse effects, before any development consent is granted. Where a project proposal has previously been considered as part of a wider SEA at plan level, this can help to inform a more detailed assessment at project level.

⁵ The issues set out in the Environmental Assessment (Scotland) Act 2005 are biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage, including architectural and archaeological heritage, landscape and the inter-relationships between the issues listed.

⁶ Environmental Assessment (Scotland) Act 2005. <https://www.legislation.gov.uk/asp/2005/15>

⁷ SEPA (2019) Strategic Environmental Assessment SEPA Guidance Note 6 Guidance on consideration of climatic factors in Strategic Environmental Assessment. Available at: <https://www.sepa.org.uk/media/344236/climatic-factors-web-version.pdf>

⁸ Scottish Government (2010) Consideration of climatic factors within Strategic Environmental Assessment. Available at: <https://www.gov.scot/publications/consideration-climatic-factors-within-strategic-environmental-assessment-sea/>

In Scotland, EIA is given effect through nine different EIA sector regulations, including those covering transport, energy, town and country planning, and marine licensing. These regulations explain which projects always require EIA ('Schedule 1 projects' such as motorways, airports and nuclear power stations) and which projects require EIA if they meet certain criteria, including size and geographical location ('Schedule 2 projects' such as renewable energy, waste management and mixed use developments). Importantly, where an EIA is not needed for a project which requires development consent, this does not, however, mean that environmental issues are not considered through the planning system, or environmental regulation requirements. For example, where a housing development does not require EIA, the related planning application will still be supported by relevant environmental survey and assessment information, such as a flood risk assessment.

2.4.2 Considering greenhouse gas emissions in EIA

The first EIA Directive, issued in 1985⁹, has been amended or replaced on a number of occasions. The Preamble to the most recent Directive (Directive 2014/52/EU) introduces a new express requirement to consider the impact of projects in relation to both climate change mitigation (emissions reduction) and adaptation. This reflects the increased emphasis being placed on climate change in policy making (preamble point 7) and an acknowledgement that climate change will continue to cause damage to the environment and compromise economic development (point 13). The deadline for transposing the Directive into national legislation was May 2017.

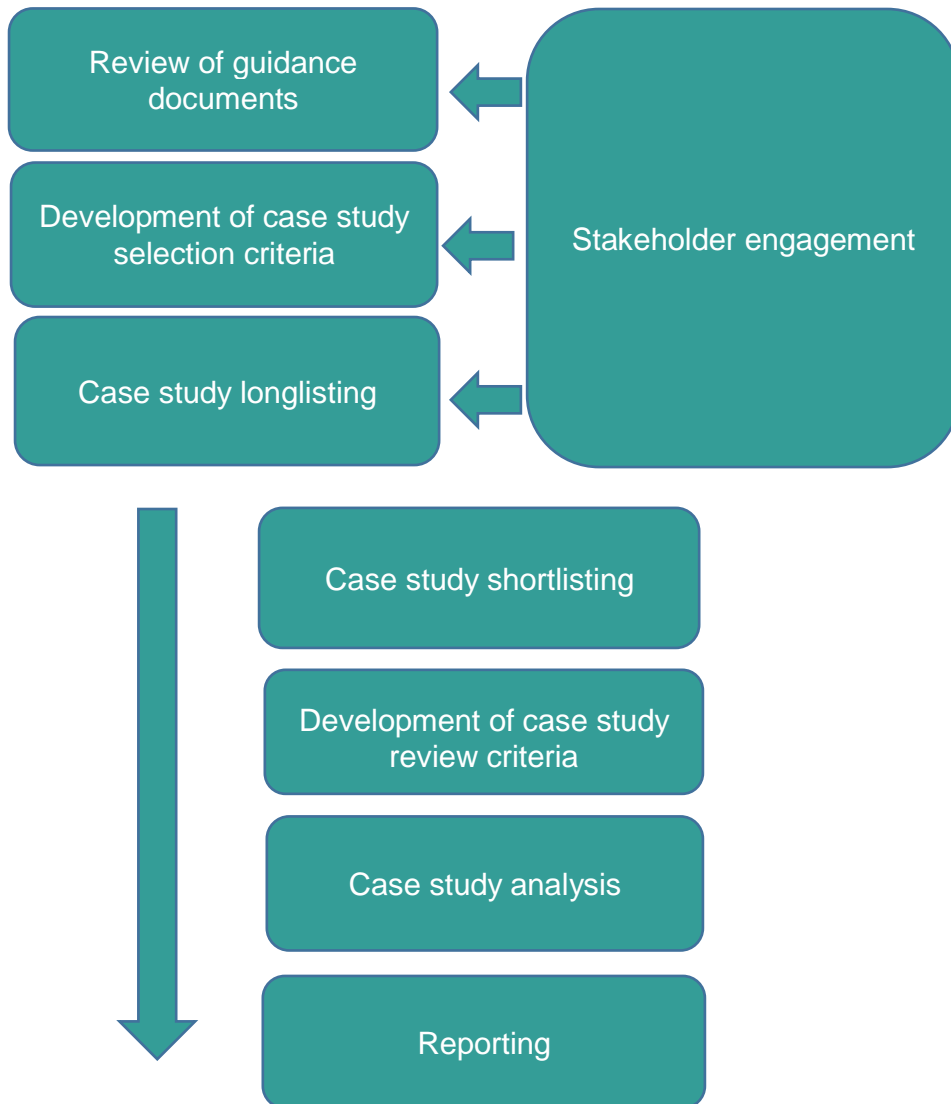
In response to this new requirement, the Institute of Environmental Management and Assessment (IEMA) produced the following guidance:

- Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (2015, revised 2020);
- Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (2017).

⁹ Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment.

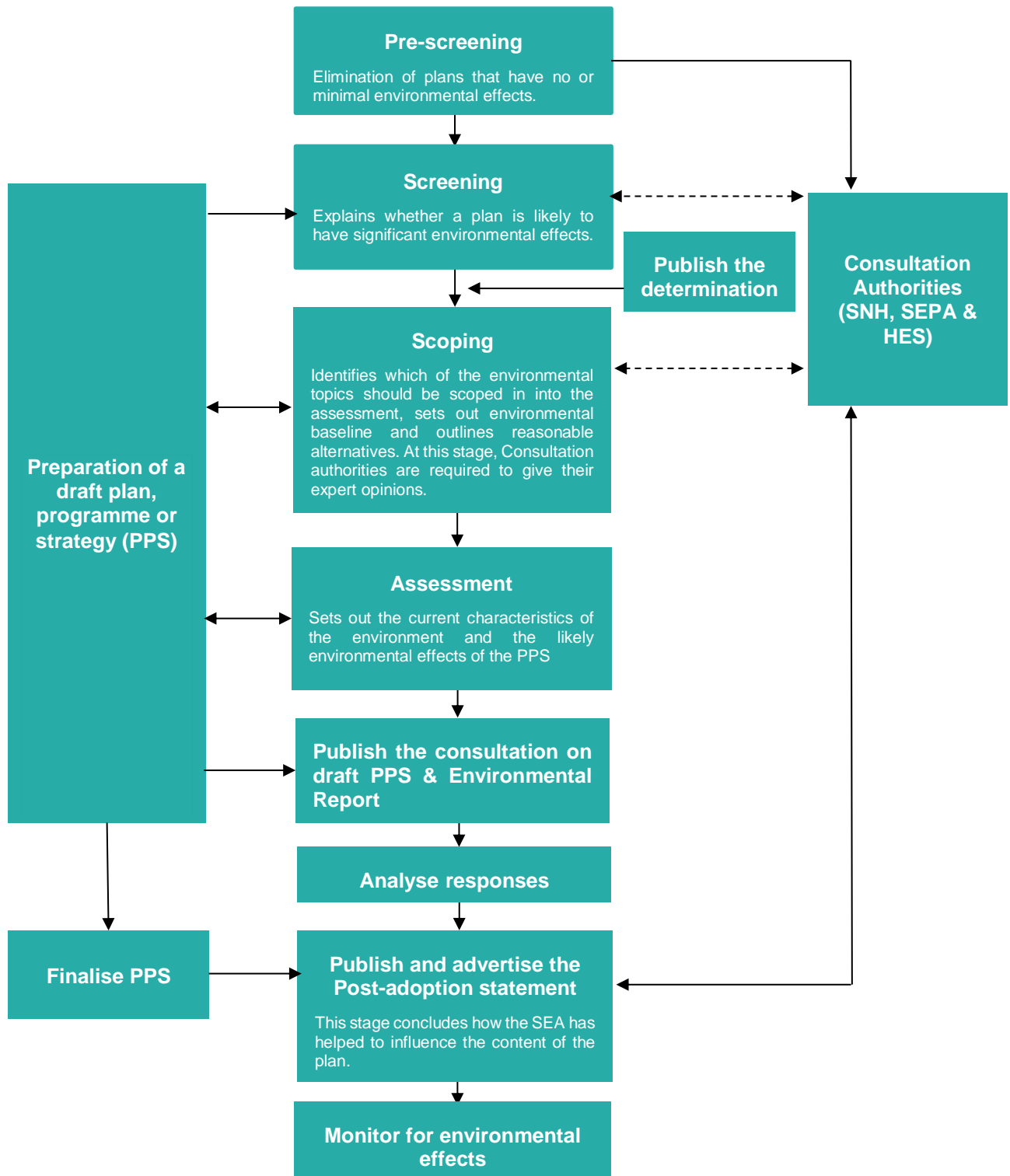
2.5 Overview of methodology

The stages of the research are illustrated in the diagram below, and a more detailed description of the methodology is provided in Appendix 8.1.



2.6 Overview of SEA process

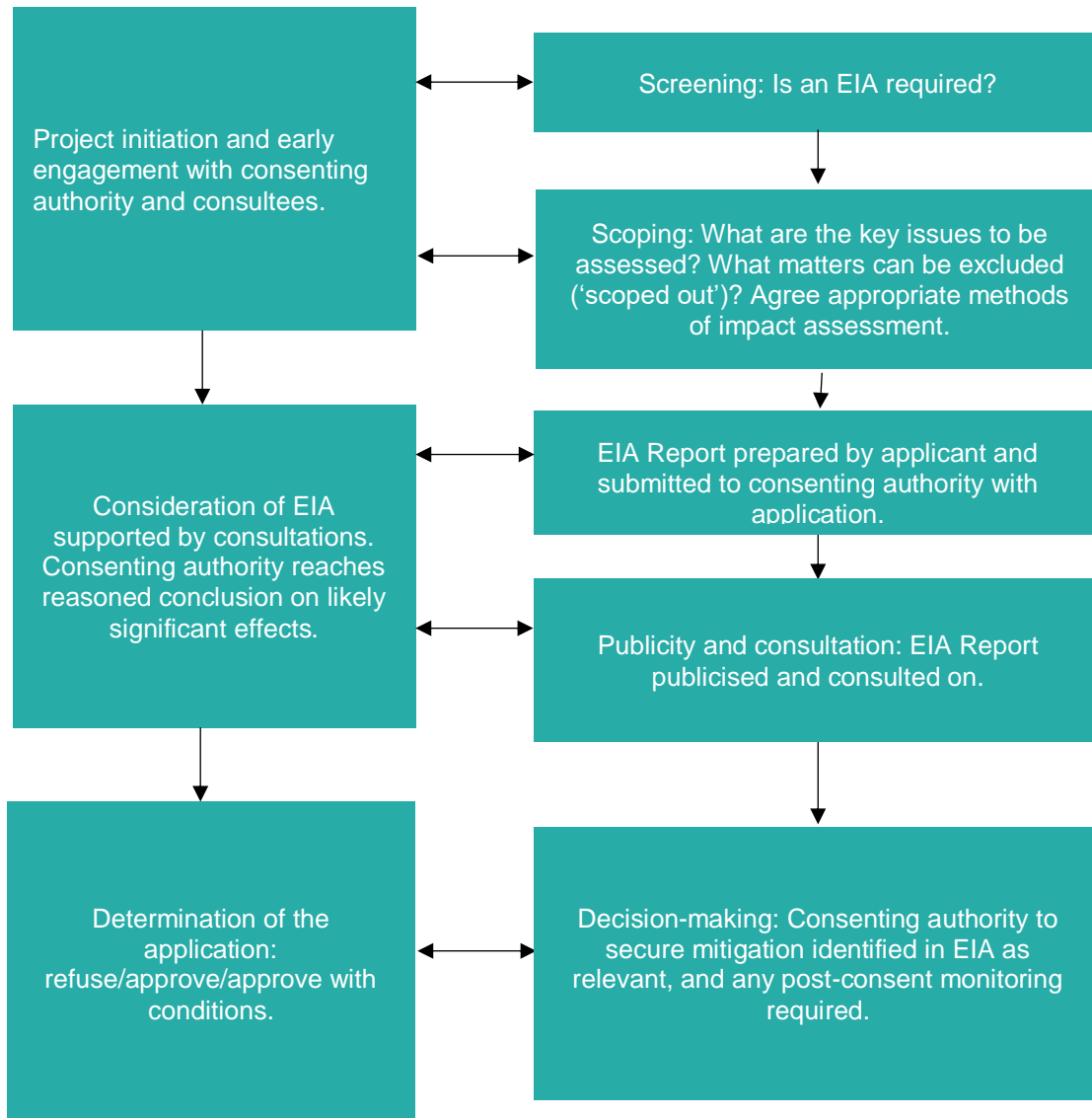
The diagram below is adapted from the Scottish Government’s ‘A basic introduction to SEA’¹⁰ and illustrates the main stages in the SEA process. Further clarification on the terminology used in SEA is provided in the glossary.



¹⁰ <https://www.gov.scot/publications/strategic-environmental-assessment-basic-introduction/>

2.7 Overview of EIA process

The diagram below is adapted from the Scottish Government's Planning Advice Note 1/2013: Environmental Impact Assessment (updated in 2017)¹¹. It illustrates the main stages in the EIA process, and their interaction with the consenting process. Further clarification on the terminology used in EIA is provided in the glossary.



2.8 Current guidance documents

A review of current guidance documents for both SEA and EIA was undertaken to inform the context for the study.

2.8.1 Summary of key findings: SEA

The review of guidance documents relevant to SEA included:

- Environment Agency (2011) Strategic Environmental Assessment and Climate Change – guidance for practitioners

¹¹ Whilst the Planning Advice Note primarily considers EIA for projects which require planning permission, the broad stages apply irrespective of consenting regime.

- European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment
- SEPA (2019) Guidance on consideration of climatic factors in Strategic Environmental Assessment

Additional relevant reports and guidance which are not specific to SEA, but were identified as providing relevant context included:

- Scottish Government (2012) Spatial Planning Assessment of Climate Emissions – SPACE. Development Stage Report
- Sustainable Scotland Network (2018) Guidance on Completing Public Bodies Climate Change Duties Annual Reports
- Scottish Government (2011) Quantitative Greenhouse Gas Impact Assessment: A Tool For Spatial Planning Policy Development: Phase 1 - Feasibility Report
- Brander, M. and Jackson, D. (2020) Greenhouse Gas Emissions and Infrastructure Investment Decisions, ClimateXchange

The guidance documents typically support explicitly identifying all types of GHG emissions: carbon dioxide; methane; nitrous oxide; hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆), nitrogen trifluoride NF₃ and the sources of these emissions.

Two of the three guidance documents advocate using quantitative baseline information to inform the assessment. The first suggested stage is to understand all potential sources of GHG emissions, including from land use change. These should then be used to determine the overall effect. This then allows the significance of the effect to be evaluated.

The SEPA guidance sets out examples of SEA climatic factors objectives and assessment questions, and these steer towards a qualitative approach to assessment.

The Environment Agency guidance focuses on identifying direction of travel rather than quantifying greenhouse gas emissions.

The non-SEA specific tools and guidance set out the data requirements by emissions source which are needed to inform the calculations of GHG emissions. This typically includes quite a high level of detailed information.

2.8.2 Summary of key findings: EIA

The key guidance document of relevance is IEMA's Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (2017). Additional guidance of relevance includes:

- IEMA (2017) Strategy for Delivering Proportionate EIA.
- Scottish Government (2018) Carbon calculator for windfarms on Scottish peatlands: factsheet and technical guidance.

IEMA's EIA Guide to Assessing Greenhouse Gas Emissions recommends that a broad 'life cycle' approach is taken, with consideration given to direct and indirect emissions. Indirect emissions should include embodied carbon arising from the materials and systems which form temporary and permanent structures and is a result of the extraction and manufacture of materials, fabrication, transport to site, waste and also the future demolition and potential for re-use.

The guidance also states that the generation of GHG emissions should be considered at all stages of the EIA process, for example:

- Has any review of alternatives considered likely contribution to GHG emissions¹²?
- Has GHG emission mitigation formed part of the project design brief (e.g. reducing the extent of new build, using low carbon technologies, materials and products and reducing resource consumption generally)?
- Has an assessment of the generation of GHG emissions been undertaken if appropriate, and to an agreed methodology?
- Do the mitigation proposals further consider carbon reduction measures such as consideration of energy demand/ management, and the scope for planting/ afforestation?

IEMA's Guide presents several methods to assess greenhouse gases within the EIA process. There is a strong emphasis on the fact that greenhouse gases are measurable and should therefore be quantifiable.

IEMA's guidance suggests that as GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, any GHG emissions or reductions from a project might be considered to be 'significant'. Notwithstanding this, there is a focus on proportionate assessment within both IEMA guidance documents. This suggests that the assessment of GHG emissions should be proportional to the scientific evidence available.

There are five basic steps which should inform the assessment of greenhouse gas emissions in EIA:

- Define goal and scope of GHG emissions assessment;
- Set study boundaries;
- Decide upon assessment methodology;
- Collect the necessary calculation data; and
- Calculate/determine the GHG emission inventory.

A working group has just been set up to review and update IEMA's 2017 guidance, given that it is three years since updated requirements to address climate change in EIA were transposed into UK EIA regulations. It is recognised by IEMA that whilst practice to date is 'patchy', there are some good practice examples. IEMA anticipate that the updated guidance will emphasise the importance of the design stage, with a new 'step zero' prior to commencement of the EIA and will provide more examples of practical tools for quantifying GHG emissions. The carbon calculator for windfarms on Scottish peatlands¹³ provides sectoral guidance to assess, in a comprehensive and consistent way, the carbon impact of wind farm developments. This focuses on the carbon savings, carbon losses and payback period associated with the project to determine potential impacts.

¹² The Regulations require the applicant to include in the EIA Report a description of the reasonable alternatives (development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

¹³ <https://www.gov.scot/publications/carbon-calculator-for-wind-farms-on-scottish-peatlands-factsheet/>

2.9 Report structure

The remaining sections of the report provide:

- An overview of the approach to long-listing and shortlisting, and the approach to the assessment of the case studies;
- An overview of the SEA case study and engagement findings;
- An overview of the EIA case study and engagement findings;
- Conclusions relating to both SEA and EIA

Supporting appendices include:

- Description of the methodology
- References
- Glossary.

The detailed review of the SEA and EIA case studies is provided as a separate document.

3 Overview of study methodology

3.1 Approach to case study selection

The case study selection was a two-stage approach involving the development of an initial long list which was then shortlisted. **Table 3.1** below outlines the case study selection criteria which were applied at the longlisting stage. Further detail is provided on the specific issues for the SEA and EIA case study selection in the following paragraphs.

Table 3.1 Longlisting criteria for SEA and EIA

Criteria	SEA	EIA
Timeframe	Within last 5 years	Initial search focused on between 2017 and early 2020, this was then extended to 2014
Topic	All topics (likely to be influenced by timeframe, above)	Energy, road/rail infrastructure, forestry, mixed use developments, plus any others of relevance
Scale	National, regional and local with greater focus on regional and local level PPS	Schedule 1 developments (EIA compulsory) Schedule 2 developments (requirement for EIA dependant on nature, size, location)
Type	Both section 5.3 and section 5.4 ¹⁴	Range of consenting regimes (e.g. town and country planning, energy, transport, forestry and marine works)

Geographic distribution	Scotland	Scotland ¹⁵
Coverage of GHG emissions	Includes good coverage of GHG emissions in baseline and assessment	

The approach to shortlisting for both SEA and EIA was informed by:

- the extent of information included in relation to GHG emissions in each longlisted case study, particularly the presence of quantified data;
- the inclusion of a range of topics subject to SEA and EIA, particularly reflecting development patterns and land use change in Scotland;
- variation in scale of the PPS for SEA, and
- to ensure a range of geographic distribution.

The SEA long list case studies were identified from a search of the Scottish Government SEA database. At the time of the study the database was being updated and did not contain all recent information. It was therefore used to identify potential PPS which may only have been recorded as at Scoping stage within the database but were then able to be located online. Any additional suggestions from the ongoing consultation exercise were also considered.

This yielded a long list of twenty case studies which was then shortlisted in discussion with the project steering group to provide a shortlist with variation in terms of topic, scale and geographic distribution.

The EIA case studies were initially identified from data obtained from the Institute of Environmental Management and Assessment (IEMA). This identified Environmental Impact Assessment Reports (EIA-Rs) produced by a range of environmental consultancies and completed between 2007 and 2020. An elimination process was carried out to identify potential case studies for the long list which included the following exclusions:

- EIA-Rs completed before 2017;
- EIA-Rs (or ESs) which were produced for projects located in England, Wales and Northern Ireland;
- EIA-Rs which were produced by LUC.

This did not yield a sufficient range and quantity of EIA, and additional potential case studies which fitted the selection criteria were identified as follows:

- Through an online search using the Google search engine. An initial search term of "EIA Chapter AND Climate Change AND Scotland" was used to identify standalone EIA-R chapters assessing climate change and greenhouse gas emissions.
- On the basis of LUC's own knowledge of EIA projects undertaken in Scotland and through an email approach to LUC's existing contacts within the EIA profession in Scotland.
- Through the engagement process used to inform the research.

¹⁵ The final short list of case studies included examples from England, due to the limited sample identified within Scotland.

- By contacting the Development Management teams at a number of key authorities (Edinburgh, Glasgow and Highland Council in Inverness) to see if any further potential examples could be identified.

The additional exclusion of undetermined planning applications was also applied following discussion with the project steering group. This did not yield the required number of case studies in Scotland and therefore the decision was made to include examples of relevant EIA from England.

3.1.1 SEA and EIA engagement

The purpose of the engagement was to understand current assessment and reporting arrangements, to assist in identifying relevant guidance and potential case study SEA and EIA. A list of potential consultees from Scottish Government, including Energy Consents Unit, Transport Scotland and Marine Scotland, and SEPA was drawn up based on project team known contacts and informed by the project steering group. A summary of the project scope and a set of questions were emailed to the potential consultees and a written response or discussion were requested.

Alongside the review of the case studies, the information obtained through the engagement informed the key issues identified through the project conclusions.

3.1.2 SEA engagement

Consultees were asked to respond on:

- The format and detail of greenhouse gas emissions data which would be most relevant to existing approaches to reporting;
- The key limitations or caveats associated with current approaches to collecting data and reporting greenhouse gas emissions;
- Identifying good examples of how greenhouse gas emissions have been considered in SEA;
- Identify any additional guidance documents on reporting greenhouse gas emissions in SEA.

Responses were provided from Scottish Government, SEPA and a local authority SEA practitioner.

3.1.3 EIA engagement

Feedback was requested in relation to:

- the challenges and limitations associated with current approaches to collecting data and reporting greenhouse gas emissions in EIA;
- any good practice EIA examples, particularly in terms of format and detail.

Responses were provided from leading EIA practitioners in Scotland and the UK, including those with international experience on climate change impacts.

No additional case study examples were identified, although the research team was made aware of a parallel research project being undertaken currently by Lancaster University on behalf of the Environmental Industries Commission (EIC) as part of the Commission's work on Net Zero infrastructure, and examining the 'effectiveness' of EIA climate change chapters in practice.

All those consulted expressed interest in the findings of this research project.

4 SEA case study and engagement findings

4.1 Introduction

This section of the report sets out the findings from the analysis of the ten selected SEA case studies alongside relevant information provided through the engagement process. The findings are structured by the case study review criteria, as outlined in Appendix 8.1, Methodology, which also provides further details on the engagement process.

4.2 Overview of case studies

The process of case study selection is outlined in the previous chapter. The ten shortlisted SEA case study Environmental Reports were prepared between 2015 and 2019. The case studies include local development plans, local authority level plans and strategies for climate change, renewable energy, transport, and woodland, and a sub-local tourism strategy. Two national level examples are included covering climate change and a circular economy.

The case studies are listed below:

1. Falkirk Local Development Plan 2, (2017)
2. Aberdeen Local Development Plan (2019)
3. East Renfrewshire LDP2 (2019)
4. Climate Fife – Sustainable Energy and Climate Action Plan (SECAP) 2020 – 2030 (2019)
5. Perth and Kinross Council Renewable and Low Carbon Energy Supplementary Guidance (2019)
6. Draft Climate Change Plan and Energy Strategy: joint strategic environmental assessment (2017)
7. East Lothian Local Transport Strategy (2018)
8. Cairngorm and Glenmore Strategy (2015)
9. Making Things Last: Consultation on a more circular economy in Scotland (2015)
10. Loch Lomond and the Trossachs National Park Trees and Woodland Strategy 2019 – 2039 SEA Draft Environmental Report (2019)

4.3 Research findings

The case study environmental reports were reviewed from the perspective of what information relevant to GHG emissions is recorded and how they have addressed GHG emissions through the SEA process. The case studies were reviewed against the following review criteria:

What sources of GHG emissions have been identified in the baseline?
How do the sources of GHG emissions identified relate to the scope of the PPS?
What quantitative information on GHG emissions is recorded in the baseline?

What qualitative information on GHG emissions is recorded in the baseline?
How is quantitative information on GHG emissions reflected in the SEA?
How is qualitative information on GHG emissions reflected in the SEA?
What is the approach to the justification of significant effects?
How closely are the monitoring indicators linked to the SEA objectives and baseline?
What are the benefits of the approach used?
What are the apparent limitations of the approach used?
If a tool has been used, which tool has been used?

The review has also identified where information is included which was relevant to GHG emissions, but was not taken into account in the SEA.

It is recognised that an emphasis on GHG emissions was not necessarily an explicit driver for the assessment of the plans or strategies which have been used as case studies. Where the case study review has identified opportunities or limitations within the case studies, this is not a criticism of the individual SEA but reflects the analysis in the context of this study's purpose.

4.3.1 Sources of GHG emissions identified in the baseline

GHG emissions from a broad range of sources are reflected in the case studies' environmental baseline. For the local development plans the case study examples typically record the council's carbon footprint and contribution of renewable energy generation under the topic of 'climatic factors'.

Other key SEA topic areas which provide coverage of sources of GHG emissions (which are not reflected under the topic 'climatic factors') include:

- Peat and high carbon soils, reflected under SEA topic 'soil';
- Air pollution and sources of air pollution reflected under SEA topic 'air'. Some sources of air pollutants which are also GHG emissions sources e.g. transport may only be identified in relation to their air pollution impacts;
- Travel and commuting, typically reflected under population and human health or material assets, but not identified in terms of GHG emissions;
- Waste and recycling, reflected under material assets but typically with no reflection of the relationship to GHG emissions from waste under the material assets topic or the climatic factors topic.

Although the case studies typically include a range of data relevant to GHG emissions, much is included under other SEA topics and not explicitly related to the GHG emission impact. For example including reference to land use change in relation to soil, but not relating this to GHG emissions. The overlap between topics is an inherent feature of the

SEA process, as an environmental issue tends to have strong relationships with many topics¹⁶. However, in seeking to identify the overall impact of a plan, programme or strategy on GHG emissions then this overlap will create challenges if reporting on the potential sources is dispersed amongst the SEA topics. This highlights a key issue of consistency within the SEA process whereby GHG emissions may not be comprehensively reflected in the assessment or reporting.

4.3.2 What quantitative and qualitative information on GHG emissions is recorded in the baseline?

The majority of the case studies include a high proportion of quantitative baseline data, particularly in relation to data provided under 'climatic factors'. For climatic factors the environmental baseline for the three LDP case studies tended to include information on the carbon footprint for the council area (as a whole or per capita) and on renewable energy generation. The case studies include how much electricity is currently generated using renewable and low carbon sources or identify the potential and future demand. The case studies which are not LDPs include information on the total GHG emissions for the area covered by the plan/strategy and GHG emissions by sector.

Other baseline information which would be relevant to GHG emissions, but is not identified as such is included under other SEA topics. For soil all of the case studies include baseline information on carbon rich soils. For the LDPs, they also include detail on mineral and coal working sites (operating and abandoned) and they list prime quality agricultural land or agricultural land classes. The information is presented quantitatively and spatially in some of the case studies, but only referenced qualitatively in others. A common omission is lack of recognition of the area of degraded peatland in an area, potentially reflecting a lack of data availability to the SEA assessor. The main threat for release of carbon from peatlands arises from degradation of these soils due to factors like erosion, drainage, afforestation, over-grazing, pollution and peat extraction¹⁷. However even where baseline data is included on soils the case studies did not identify the GHG emissions associated with soil.

Air quality baselines typically include information on the concentrations of key air pollutants (NO₂, PM₁₀, and PM_{2.5}). Recognising that there is some overlap between the sources of air pollution and sources of GHGs, this could provide a proxy data source for GHG emissions but is not identified as being used as such in the case studies examined.

Population and human health data mainly cover commuting patterns and recreation levels. Commuting patterns are included as quantitative data and qualitatively. The local level strategy provides a quantified description of the mode of travel to work and the distance travelled. This is also covered by two of the LDP. One of the climate change focused plans refers to commuting patterns, but does not quantify them, and they are not referred to in the transport strategy environmental report or one of the LDP environmental reports.

For two of the non-LDP case studies, population growth is also included. Population growth is a potential key indicator of emissions due to known current levels of energy use, travel patterns, and waste generation for an area, but is not identified as being used for this purpose in the case studies. Again, this illustrates where data is included which could be used to inform the assessment of GHG emissions, but is not recorded in the assessment as a GHG emissions source.

¹⁶ For example the issue of active travel is relevant to climatic factors, air, and population and human health.

¹⁷ Climatexchange Indicators and Trends, Monitoring Climate Change Adaptation. NB 18 Annual greenhouse gas (GHG) emissions from degraded peatland. Available at: https://www.climatexchange.org.uk/media/2519/nb18_ghg_emissions_from_degraded_peatlands_branded_template_290316.pdf

The LDP case studies include the GHG emissions sources of waste and traffic under the SEA topic 'material assets', but do not reflect on the GHG emissions of these sources.

In the non-LDP case studies, they include a range of different GHG sources such as waste arisings, waste recycling rate, traffic volumes and commuting patterns, transport infrastructure and levels of materials consumed. Commuting and travel patterns are not consistently identified in all case studies under any of the SEA environmental topics where this would be relevant.

For landscape the LDPs focus on green spaces mapping and presenting the split of developments allocated on greenfield versus brownfield sites. Whereas, the non-LDP case studies contain more information on existing woodlands and forests, types of agricultural land, landscape change and areas covered by national parks. Loss of greenfield land to development, land use change and woodland and forestry expansion all have potential impacts on GHG emissions but are not consistently recognised within the case studies.

Biodiversity, flora and fauna is similarly covered across all case studies, the baseline information tends to include woodland area, local biodiversity sites and protected habitat sites. These are relevant to carbon sequestration, but only recognised as such in two examples relating to renewable energy and forestry and woodland.

Engagement with several SEA professionals identified that there may be issues with the compatibility of the scale of available GHG data and the scale of the plan area. The lack of available GHG emissions data at the same scale of a plan may limit the approach to the assessment. For example this is acknowledged in Environmental Reports when identifying the data limitations for two of the non LDP case studies, for which local authority scale data was not compatible with the sub local authority scale of the strategy.

Half of the case studies provided some data on trends relevant to GHG emissions, although data on trends was highlighted through the engagement process as a data challenge. This was identified as limitations with data availability on the use of materials and embedded carbon/principles of a circular economy such as GHG emissions associated with waste from the construction industry or use of low carbon materials/retro fitting.

The engagement process identified that some detailed data on GHG emissions is available such as the [Scottish Pollutant Release Inventory](#) (SPRI). All the major industrial sites in Scotland provide SEPA with their annual emissions of GHGs, in kgs, and SEPA publishes this data. However, this data source relates to specific sites, which may only be relevant to some plan content as not all plans are spatially specific. One of the case studies identified the major industrial sites within the area, but did not include information on the GHG emissions associated with these.

4.3.3 How is quantitative and qualitative information on GHG emissions reflected in the assessment?

The scope for a SEA to quantitatively assess GHG emissions is significantly influenced by the content and scope of the strategy being assessed. For example, although one of the case studies identifies the areas of land suitable for different types of renewable energy technology development, it does not include information on the extent of development which may take place in these areas, as this is not within the scope of the Supplementary Guidance. Similarly, another non-LDP case study includes a wide range of actions which will support climate change mitigation. The plan also refers to the overall quantified carbon reduction which the plan is seeking to achieve. However, the plan content is based on a range of actions which support progress in meeting this target, but the actions within the plan are themselves mostly unquantified. The specific effects of a plan are therefore uncertain, which is then reflected through the assessment.

The SEA process requires the assessment of reasonable alternatives to the plan or strategy. For the case studies which included alternatives in some instances these related to an alternative quantitative target to that put forward in the plan or strategy. It may be expected that a quantitative target may be assessed quantitatively through the SEA process, however the approach to assessing a quantitative target was still qualitative. This may in part reflect the qualitative changes in the approach of the plan or strategy in meeting this quantitative target. This further reinforces the identified qualitative approach to assessment throughout the case studies, and highlights the emphasis on qualitative assessment in the SEA process, even where a quantitative target is included in the plan or strategy.

The approach to the assessment and presentation of the assessment findings also influences the extent to which the assessment findings in relation to GHG emissions are clearly identifiable. SEA is commonly supported by assessment matrices which score the elements of a plan or strategy against each relevant SEA topic, and provide text justifying the score given. However, alternative assessment / reporting methods may also be used, particularly where a plan or strategy is more strategic in nature. This can be done in a variety of ways, some of which provide greater clarity than others. A number of the case study matrices provide justification text which summarises the overall environmental effects for an aspect of the PPS across all SEA topics. Although this is a fairly common approach in SEA, it frequently means that individual assessment scores for some topic areas are not consistently justified in the text. For example, a significant positive score may be provided in the matrix for climatic factors, but no justification text is provided in the commentary. This is further complicated where assessment questions cover a range of impacts relating to both climate change mitigation and adaptation.

4.3.4 How do the sources of GHG emissions identified relate to the scope of the PPS?

Considering how the sources of GHG emissions identified in the environmental baseline and assessment relate to the scope of the PPS provides information on the alignment of the baseline data and the likely impacts of the PPS.

Two of the case studies use comprehensive State of the Environment Reports¹⁸ as the baseline. State of the Environment Reports can provide a comprehensive summary of the environmental baseline in relation to GHG emissions due to their need to be applicable to a range of SEA. The environmental baseline based on the State of the Environment Reports was identified as being more comprehensive than the environmental baseline included in the other case studies. However, for both case studies based on State of the Environment Reports, the approach to the assessments is very different. This reflects the strongly spatial constraints mapping focus of one of the case studies.

The environmental baseline in all case studies typically includes information relevant to climatic factors but reflected under different SEA topic areas and not explicitly related to climatic factors. For example, issues such as population growth have key implications in terms of land for housing, travel patterns and energy use.

In some instances, data relevant to the scope of the PPS and relevant to GHG emissions, and would be expected to be available - is only included qualitatively. This may indicate that data is a key constraint, and that data sources available for one SEA assessor may not be accessible to another, depending on local circumstances.

¹⁸ A State of the Environment Report is sometimes prepared by a local authority to provide a single point of reference on environmental issues in that area and is maintained with up to date environmental information from internal and external sources, including changes over time which are relevant to undertaking Strategic Environmental Assessment.

The majority of the case study PPS have a broad scope and therefore GHG emissions from a wide range of sectors are relevant to the assessment. However, this makes the assessment process additionally complex compared to a PPS with a narrower topic scope.

The engagement process identified that environmental reports can include available data that may not be relevant to the PPS. This may particularly be an issue where the PPS is at a scale for which there is no comparable published data on GHG emissions. For example, data is often produced at national or local authority level and not below this. This is illustrated by the case study which covers a sub-local authority plan area. To address the issue of data availability for the strategy, they included key caveats about the availability of data appropriate to the area. They also used a series of maps to illustrate the spatial distribution of data, for example traffic emissions, which allowed area specific data to be illustrated.

4.3.5 Approaches to the justification of significant effects

The approach to the justification of 'significant' is typically qualitatively defined. It is not related to any particular environmental threshold. The SEA for one of the LDP¹⁹ is unique amongst the case studies as it defines significance in relation to each SEA topic area, however this is not related to the environmental baseline. The approach used for significance in relation to 'climatic factors' is illustrated below:

	--	-	+	++
Climatic Factors	Significant Increase in greenhouse gas emissions	Increase in greenhouse gas emissions	Decrease in greenhouse gas emissions Creation of carbon sinks	Significant decrease in greenhouse gas emissions. Creation of significant carbon sinks

The SEPA Guidance on Consideration of Climatic Factors in SEA (2019) identifies example qualitative indicators for significant effects. The guidance further acknowledges that the main issue with assessing the effects of a PPS on climatic factors is determining the scale on which significance should be considered. This clearly reinforces the qualitative approach seen within the case studies which allows greater flexibility in the assessment. However, the guidance does request the inclusion of details of how terms such as "large" or "moderate" will be interpreted and applied consistently. This is not evidenced from the case studies, and to achieve this would require greater reference to the relevant environmental baseline. This is constrained by the issues of:

- Partial identification of GHG emissions in the Environmental Baseline. Although this research has identified that other potential sources of GHG emissions are included under other SEA topics, they are not identified in the Environmental Report as GHG emissions sources.
- Inconsistent inclusion of likely significant sources of GHG emissions.

¹⁹ Falkirk Local Development Plan 2 Main Issues Report Environmental Report Appendix 2: Detailed Environmental Assessment Matrices <https://www.falkirk.gov.uk/services/planning-building/planning-policy/local-development-plan/plan-two/docs/sea/03%20Appendix%20%20-%20Detailed%20SEA%20Matrices.pdf?v=201906271131>

- The use of qualitative baseline data, where quantitative data is expected to be available.

The engagement process identified challenges in attributing the scale of significance of GHG emissions as climate change is a global issue, but plan content may relate to a local (or regional) issue. There are also challenges identifying links between climate change effects and local actions. This is evidently a particular area of challenge for SEA reflecting some of the wider issues being faced in accounting for GHG emissions, such as available evidence and uncertainty.

4.3.6 Relationship between monitoring indicators, SEA objectives and baseline

A review of the relationship between the monitoring indicators, the SEA objectives and the environmental baseline illustrates the different data sources which are identified through the SEA process and how they are used.

Not all of the case studies include detail on the proposed monitoring indicators. Where a proposed monitoring framework is included this is typically based on quantitative data sources. A key finding from the case studies is that the quantitative data sources identified in the monitoring framework were not consistent with the data sources used in the environmental baseline. This suggests that there is an opportunity for SEA practitioners to align the elements of the assessment process more efficiently.

This illustrates that the identification of quantitative baseline data which would be also be relevant to monitoring could be encouraged earlier in the assessment process. Monitoring will also need to make judgements on the significance of effects based on data, similar to the assessment process, offering potential for greater alignment.

There can be a mismatch between the information used to inform the original plan and strategy and the information used in the SEA. For example, one monitoring framework is based on a range of transport related statistics which would have been relevant to the SEA, but which are not referred to in the Environmental Report.

It is acknowledged that data gaps should be listed in the Environmental Report, to identify where there is a lack of supporting data. However, where the monitoring framework lists data from existing data sources which are not included in the environmental baseline, this can point to a lack of consistency in the SEA process.

4.3.7 Use of tools

None of the SEA case studies used carbon assessment tools, although one LDP referred to the use of the SPACE tool in the assessment criteria, this did not appear to have been applied.

4.3.8 Conclusions reflecting the benefits and limitations of the approaches used

The information provided through the engagement and illustrated through the case studies confirms that the practiced and most realistic approach to assessment of GHG emissions is through a qualitative approach.

The key issues for providing a quantitative assessment are:

- Available data to inform the SEA is not at a relevant scale to the plan content, as not all PPS align with the scale at which GHG emissions data is available.
- Plan content is predominantly qualitative, and the effects of this content are therefore unquantifiable.
- Significance is qualitatively defined across the case studies.
- Assessment questions are qualitative in nature.

Additional context for conclusions

Consultees identified the relevance to this research to the key issues identified in the Scottish SEA Review (2011). The findings of the Review provided specific coverage of SEA and Climate Change, which are relevant to this study. Key issues included:

- Identifying the role of SEA in helping public authorities demonstrate how a PPS meets the public bodies duties under the Climate Change (Scotland) Act.
- Identifying that many stakeholders and a few practitioners called for greater use of more formalised and detailed carbon assessments within SEA. This was due to the nature and scale of the targets set in the Climate Change (Scotland) Act.
- Identifying that methods to assess the carbon impacts of policy areas can be resource intensive, requiring data to be collected for each policy appraised.
- Quantitative data on greenhouse gas emissions arising from a PPS were difficult to secure (as they require a degree of modelling) but when such data are available assessment of emissions is easier.

The overall conclusion of the Review in relation to SEA and Climate Change recommended that:

SEA should be afforded an enhanced role in delivering the Scottish Government's climate change policy objectives. Responsible Authorities should use SEA more effectively to meet their responsibilities under the Climate Change (Scotland) Act 2009 and should also better align indicators used in assessments and monitoring to established national and local climate change objectives.

In relation to the scope and findings of this current research, the issues identified in the report remain valid. This would appear to be linked to the main challenges to quantifying GHG emissions highlighted in this research.

5 EIA case study and engagement findings

5.1 Introduction

This section of the report sets out the findings from the analysis of the ten selected EIA case studies alongside relevant information provided through the engagement process. The findings are structured by the case study review criteria, as outlined in Appendix 8.1, Methodology which also includes detail on the approach to wider engagement (who was approached and what questions were asked/responses sought).

5.2 Overview of case studies

The EIA case studies examined ten Environmental Impact Assessment Reports (EIA-R) or equivalent²⁰, prepared between 2009 and 2019. The case studies include a wide range of projects across several different consenting schemes.

The selected case studies comprise the following projects:

- Two wind farm developments;
- Three road construction projects;
- One mining development;
- One forestry development;

²⁰ The findings of English EIAs are presented in Environmental Statements (ESs), as are Scottish EIAs prepared under the 2011 EIA Regulations. One non-EIA example is also included, where the GHG emissions assessment is included in an Environmental Report.

- One marine infrastructure development;
- One mixed use development, and;
- One recreational development.

Whilst the majority of case study developments are located within Scotland, the large-scale mixed use and recreational EIA examples are from England. This is because whilst these types of developments are considered very relevant in considering the capture of data on GHG emissions at the project level in Scotland, no suitable Scottish EIA examples could be identified. The full list of case studies is set out below. The detailed case study reviews are included in the separate Annex:

1. Benbrack Wind Farm s36C Variation (2019)
2. Cononish Gold Mine (2017)
3. Forth Replacement Road Crossing (2009)
4. Dell Wind Farm (2014)
5. Port of Cromarty Firth Phase 4 Development Invergordon Service Base (2017)
6. Cambusmore Estate Forestry Planting (2019)
7. A90/A96 Haudagain Road Improvement Project (2015)
8. Leven Road Gasworks Mixed Use Development (2018 – English example)
9. A9 Berriedale Road Improvement Works (2016)
10. Madison Square Gardens Entertainment and Leisure Development (2019 – English example).

5.3 Research findings

At the outset, it is important to note that the long-listed case studies were intentionally selected because they contained some level of assessment of GHG emissions, with the majority including at least some components of this assessment presented in a quantitative format. Whilst appropriate for providing a level of detail on examples of existing practice, this should not be considered to necessarily reflect wider EIA practice.

5.3.1 Quantitative and qualitative data provided on GHG emissions

Table 4.1 below provides a summary of the extent to which quantitative (shaded orange) and qualitative (shaded teal) data has been included on GHG emissions for the EIA case studies.

Table 4.1: Quantitative and qualitative data provided on GHG emissions

	Benbrack Wind Farm	Cononish Gold Mine	Forth Road Replacement	Dell Wind Farm	Port of Cromarty Firth	Cambusmore Estate Forestry	A90/A96 Haudagain Improvement	Leven Road Gasworks Mixed Use	A9 Berriedale Braes Improvement	Madison Square Gardens
Baseline										
Construction										
Direct										
Indirect										
Embodied Carbon										
Operation										
Direct										
Indirect										
Embodied Carbon										
Decommissioning										
Direct										
Indirect										

Embodied Carbon										
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The majority of the case studies (eight out of ten) have not provided baseline data on GHG emissions. Some case studies have provided justification for this by stating that the baseline is considered to be 'nil' as the site is currently undeveloped, meaning that there are no associated emissions (although the site could arguably still be storing carbon). This is similar to example methods presented within IEMA guidance.

However, the baseline for the assessment of GHG emissions arguably goes wider than the site boundary. This is reflected in the baseline descriptions for a road construction project and marine infrastructure development. These case studies have presented high level summaries of GHG emissions recorded at a national level such as CO₂e emissions per capita and CO₂ emissions derived from the Transport Model for Scotland. The use of national level data is likely to reflect the limited data sources on GHG emissions at a more regional or local level.

The majority of the case studies (seven out of ten) have included quantified information for the construction phase of the development, commonly covering direct, indirect and embodied emissions. These examples often include the quantification of emissions such as embodied carbon within construction materials, the associated transport emissions from construction material delivery and onsite plant fuel usage. In a number of cases, this is likely to be aided by the fact that projects are likely to experience similar or common construction activities which makes the quantification of GHG emissions easier to evaluate as there will be existing data upon which to draw. Only one case study qualitatively addressed GHG emissions associated with the construction of the development.

Six of the ten case studies have included some degree of quantification of operational GHG emissions, although only four of these have included direct, indirect and embodied emissions. In two additional case studies, a qualitative assessment of emissions has been included. For marine infrastructure development, although the EIA-R states that operational emissions are beyond the control of the project itself, the qualitative assessment considers emissions arising from external activities associated with the use of the port (e.g. offshore renewables and cruise ships).

The assessment of GHG emissions at the decommissioning phase is the least well documented. This is often scoped out on the justification that the emissions cannot be accurately predicted due to the lifespan of the project.

In the case of the mixed use development, the Energy Statement and Sustainability Assessment which also accompanied the application contained further information on quantified GHG emissions associated with the scheme. This is consistent with comments received through the engagement process which highlighted that when relevant data is gathered, it may be stored outside the EIA core documents (such as in Sustainability/Energy Statements or CEEQUAL/ BREEAM documentation). For example, the engagement process highlighted a 2017 study undertaken by the Netherlands Commission on Environmental Assessment (NCEA)²¹ which gathered twelve international examples of SEAs and ESIA's (Environmental and Social Impact Assessments) which were considered to have influenced a project or plan to such an extent, that it contributed to climate change mitigation or adaptation. This included an ESIA for a housing development in North West Cambridge, England (2012), where GHG emissions were addressed in a supplementary Carbon Reduction Strategy.

²¹ Netherlands Commission on Environmental Assessment (NCEA) Environmental Assessment for Climate-Smart Decision Making: Good practice cases (2017) Available at: https://www.commissiomer.nl/docs/mer/diversen/2017environmental-assessment-for-climate-smart-decision-making_good-practice-cases.pdf

Importantly, the engagement undertaken with EIA practitioners to inform this research highlighted the challenges in quantifying GHG emissions at an early stage of project development, prior to the detailed design work being undertaken. This commonly only happens after a project has been consented and there is more certainty that it will proceed to construction, and not at the application and EIA Report preparation stage. For example, prior to any project being consented, it can be difficult to quantify the likely greenhouse gas emissions from construction traffic accessing the site, and from non-road mobile machinery and generators temporarily used to power machinery and equipment onsite. Equally, embodied carbon emissions are difficult to calculate, even approximately, when the type and source of building materials are not known.

The EIA Regulations do accommodate multi-stage decision-making processes, where these exist to establish the acceptability of a proposal before developing detailed proposals. For example, the granting of planning permission in principle can be made subject to planning conditions which require the granting of subsequent approvals or consents, which allow more detail to be added at this later stage. However, the requirements of the EIA Regulations must still be met in full for an application for planning permission in principle and it can be challenging to provide a robust assessment of likely GHG emissions at this stage, even allowing for a range of possibilities within clearly defined parameters (known as 'the Rochdale Envelope approach').

5.3.2 Tools used to assess GHG emissions

The majority of the case studies reviewed employed some form of tool as part of the assessment, most commonly to record either embodied GHG emissions in the required construction materials or GHG emissions associated with transport movements. This is most likely to be the case where the 'primary' quantification has already been undertaken for the project, of either material quantities or vehicle movements, which then enables a relatively simple 'secondary' quantification of the corresponding GHG emissions.

For example, two of the roads projects have used a Carbon Management System Project Tool, developed by Transport Scotland, to provide a bespoke tool to quantify embodied carbon within construction materials and waste.

Both wind farm developments used the Carbon Calculator for Scottish Wind Farms on Scottish Peatland, in accordance with Scottish Government guidance. This captures the majority of emissions associated with the construction and operation of wind farms, excluding emissions from vehicle movements, and also captures carbon 'losses' such as the loss of carbon stored in peatland and the loss of carbon-fixing potential as a result of forestry clearance. Whilst this is a helpful tool for onshore wind projects, it is important to note that other energy technologies do not have the same tools available, which may present challenges to establishing the baseline, assessing lifetime net emissions and weighing these up against the benefits of a development. This challenge is likely to increase as more more hybrid developments or energy systems come forward, which combine different energy sources performing different roles in a single site under a single EIA.

Engagement with EIA practitioners also highlighted the Environment Agency's 'Eric e:Mission' carbon planning tool which provides a mechanism for assessing GHG emissions over the whole life of the Agency's built assets in England. It enables a high level and relatively simple Excel-based assessment to be undertaken at the option

selection stage, using drop down options which automatically calculate approximate GHG emissions for the various stages and components of a project.²²

5.3.3 How has impact significance been determined against the baseline and with reference to policy and guidance?

The approach to determining impact significance varies. This does not conflict as such with the relevant EIA guidance which does not recommend one single approach to this, as highlighted in a number of the case study examples.

In most cases, it has not been possible to determine impact significance by comparison against the baseline due to the absence of included data in relation to the latter. A number of the case study examples have used existing thresholds such as the UK's Carbon Budget to contextualise the overall impact of the scheme, noted for three of the case studies.

Two case studies have also adopted the IEMA guidance's suggested approach that all GHG emissions are arguably considered significant, which then leads to an emphasis on mitigation and management measures. The case study EIAs undertaken prior to the publication of the IEMA guidance were more likely to assess the impact of the quantified GHG emissions as being negligible.

Some examples have not stated an impact significance and, instead, have highlighted that the scheme is beneficial in terms of impact upon the global climate and the reduction of GHG emissions due to proposed mitigation measures or the nature of the project itself (e.g. as a renewable energy development). For example, the quantified 'payback period' for both wind farm projects has been used to highlight how carbon payback will be achieved within a short timeframe compared to the overall lifespan of the development.

5.3.4 Consultation responses

Consultation provided by statutory consultees in response to the case study applications (including both the EIA Scoping Opinions and the consultation responses to the applications) provided little to no reference to the assessment of GHGs, tending to focus more tightly on the established primary responsibilities of the statutory consultees.

For two case studies the assessment of GHGs has been explicitly referred to in consultation responses, where the two EIA Scoping Opinions stated the need to ensure that the content of the corresponding ESs aligned with local development plan policy in relation to new development and the management of carbon emissions.

5.3.5 Benefits of the approaches used

There is evidence of GHG emissions (direct, indirect and embodied) being quantified at all stages of project development (construction, operation and decommissioning) although not at all stages for all developments. GHG emissions were quantified most frequently at the construction stage, where arguably the impact is often greatest.

In many cases, accepted tools have been used in the case study examples to quantify GHG emissions, which assists in providing transparent and robust assessments.

Whilst not explicitly providing data which can inform progress against national (or more local) carbon reduction targets, the alternative use of qualitative approaches can still highlight key areas where emissions are expected, as a focus for mitigation efforts. For the marine infrastructure development, this extended to operational activities beyond the direct control of the port authority.

²²https://www.ericenvironmentagency.co.uk/story_html5.html?lms=1

Further information is available from carbonplanningtool@environment-agency.gov.uk

5.3.6 Limitations of the approaches used

Only one example, a wind farm, provided a full quantified estimate of all likely emissions. In addition to the emissions covered by the Carbon Calculator, a spreadsheet was used to capture additional emissions such as the transport of materials, labour and plant to and from site and the use of onsite plant use during construction and decommissioning.

As with any modelling exercise, the quality of the output is heavily reliant on the quality of the original data and on any assumptions made to inform the calculation process. Assumptions may be considerable given that the full detail of any development may not be worked up until post (successful) consent/approval. Whilst the application of these tools often requires assumptions to be stated transparently, there is no evidence of these being queried in consultee responses.

6 Conclusions

This section of the report sets out the overall conclusions in relation to both SEA and EIA and reflecting on the main research aims.

6.1.1 Methodologies used to assess GHG emissions impacts

For the SEA case studies, no single methodology or approach has been consistently used to assess GHG emissions impacts. The varied approaches taken to the assessment in the SEA case studies reflects the variation in scope and context of the relevant plans or strategies. For all the SEA case studies GHG emissions are assessed in relation to a qualitative assessment framework. The different approaches to SEA (either summarising environmental effects by SEA topic area, or by plan or strategy content) can provide different levels of detail in the assessment of GHG emissions impacts.

For the majority of the SEA case studies a significant level of detail is provided in the environmental baseline. This includes a wide range of potential sources of GHG emissions sources, some of which are identified under other environmental topics, but are then not related to GHG emissions or reflected in 'climatic factors'. For the SEA of LDPs it would be expected that the GHG emissions sources identified across the three LDP case studies would be similar. However this was not the case and reasons for particular differences between the examples were not obvious. This may relate to data availability or interpretation of the level of detail in current guidance on GHG emissions sources.

Several of the SEA case studies include detailed assessment questions, which are typically qualitative in nature. In general, the assessment of GHG emissions within SEA is strategic and qualitative. There is generally little quantification associated with the definition of the assessment of significance. The level of detail within the plan or strategy is typically unquantified and this is reflected in the approach to the assessment of GHG emissions in the case studies. If an action is unquantified in the plan or strategy, it will be unquantifiable through the assessment.

The SEPA guidance suggests that significance should be related to local GHG emissions. However, the case studies did not define if significance was relevant to the baseline or seek to distinguish between significance in relation to baseline GHG emissions or significance in terms of local or national targets.

Monitoring relies on quantified information and will allow retrospective quantification of effects, although there will be challenges to attribute these specifically to the plan or strategy in most instances. Despite the high level and generally qualitative approach to

assessment of effects of GHG emissions impacts, the SEA monitoring frameworks reviewed are, in some case studies, well related to the environmental baseline.

The assessment of GHG emissions impacts is not limited to the SEA or EIA processes, as illustrated by examples such as the SPACE tool. However, this was only referred to within one of the SEA case studies and it was unclear how it had been applied to the assessment process.

Similar to the findings for the SEA case studies, the EIA case studies did not identify any singular method has been applied, although there is some consistency within development sectors of wind and transport for the case studies considered. Tools used in the latter examples include the application of the Scottish Government's Carbon Calculator for windfarms on Scottish peatlands and carbon management systems developed by Transport Scotland which provide project specific parameters in which GHG emissions can be derived and impacts considered.

For EIA, information on likely GHG emissions may also be stored outside the core documents, such as in Sustainability/Energy Statements. In these cases, in addition to any qualitative or quantitative emissions data, conclusions are most likely to be drawn on compliance with planning policy/regulatory requirements. A further step then has to be taken to determine whether or not the level of emissions identified is considered 'significant' in EIA terms.

For the EIA case studies, GHG emissions in the baseline are either not included at all or are largely high level. This could be due to several compounding factors such as the lack of available data or the way in which the baseline assessment is approached such as the definitions of study areas and boundaries. For example, in some cases, the baseline is considered to be 'nil' as the study area boundary equates to the site boundary and the site is currently undeveloped, meaning that there are no associated emissions.

The level of detail in the EIA case studies is varied. Most of the EIA case studies include some degree of quantification (accepting that they were 'positively' selected for this). Detailed information is most likely to be included where the 'primary' quantification has already been undertaken for the project, of either material quantities or vehicle movements, which can then be extrapolated to enable a simple, additional 'secondary' quantification of the corresponding GHG emissions.

6.1.2 How these emissions are reported and communicated

Within the SEA case studies, the findings in relation to GHG emissions are either presented:

- as part of the summary reporting of the environmental effects for each element of the plan, or
- as a separate section summarising all effects in relation to the SEA topic 'climatic factors'.

In some of the case studies the findings are presented in both ways. Where effects are only summarised in relation to the main plan components this can be less clear in terms of demonstrating overall effects on GHG emissions.

The approach to cumulative effects²³ also provides an overview of effects on climatic factors. There is wide variation in the presentation of cumulative effects amongst the case studies. This ranges from very brief or absent coverage, through to clear presentation in relation to both the different elements of the plan and SEA topic.

²³ Cumulative effects arise as a result of interaction between different components of a plan, or between the combined effects of plans.

However, in line with the overall approach to assessment, these are presented qualitatively.

The GHG emissions reported within the EIA case studies included within this review are largely presented in one of two ways:

- within another EIA topic area, for example direct/indirect CO₂ emissions are included within the Air Quality chapter and embodied emissions in a Materials chapter topic;
- within a separate standalone climate change chapter or technical appendix.

Within the IEMA guidance there is no specific preference for GHG emissions to be presented in any particular way. The guidance emphasises the importance of the proportionate assessment of GHG emissions and delivery of a clear narrative in relation to definition of factors such as study boundaries, calculation data and GHG emissions factors.

6.1.3 Observations on the effectiveness of the approaches taken to reporting and communicating these findings

For the SEA case studies, the assessment is clearly able to identify the direction of travel arising from the plan or strategy. However, where the PPS itself is strategic in nature with only limited detail, in many instances any quantification of the effects of the GHG emissions arising from the PPS is not possible.

The assessment findings for climatic factors also include both climate change mitigation (GHG emissions) and climate change adaptation. Within the case studies, this reflects a single score against assessment questions which cover both aspects. For GHG emissions to be more clearly identifiable, there would need to be clearer separation of mitigation and adaptation in the SEA methodology.

For the EIA case studies, any data provided is communicated clearly, either as part of a standalone climate change chapter or within other technical chapters such as air quality or energy and waste, although inclusion in other technical chapters needs clearer signposting. The 'payback' approach adopted for wind farms provides a useful additional communication aid. This does assume that any underlying modelling work is undertaken robustly as this is harder to understand and/or challenge although the data used to calculate the payback period is available for the public to view on the Carbon Calculator website simply by putting in the reference number quoted in the EIA Report.

Whilst the purpose of EIA is ultimately to identify any likely significant effects, and the EIA Report will communicate this accordingly, the assessment information to support these judgements of significance, including any qualitative or quantitative data on likely GHG emissions, should still be included, possibly within technical appendices to the EIA Report.

6.2 Future implications of wider policy and practice

6.2.1 Implications for SEA

The SEA case studies have identified that significant effort is put into assessment of GHG emissions in SEA. However, there is scope for the various elements of the assessment process (baseline, assessment questions, definition of significance and monitoring) to be joined up more comprehensively.

The main factor defining the approach to assessment is the qualitative nature of the plans, policies and strategies being assessed. The role of qualitative assessment is very valid in the absence of the relevant quantitative information. The purpose of SEA is to

provide a strategic level assessment, and there may be challenges in identifying at what point it is relevant or feasible to provide a more detailed level of assessment.

The declaration of a climate emergency, commitment to net-zero emissions and local authority level actions being taken to respond to this, is likely to lead to an increase in the collection of relevant data sets, and an increase in co-ordination of existing data. These factors may also result in an increase in the level of quantification of actions included in plans, policies and strategies.

In summary, external drivers already in place may increase the capacity of SEA to include more quantitative data in relation to GHG emissions due to greater availability of this data. However the nature of the PPS is the main factor in influencing the overall approach to the assessment, including the consideration of GHG emissions.

6.2.2 Implications for EIA

This research project has revealed evidence of good practice with respect to the quantification of greenhouse gases in EIA. Importantly, a number of the good practice examples identified have used supporting tools with the potential for wider applicability.

Whilst the case study examples reviewed during the course of this research are not necessarily representative of wider practice, it is important to acknowledge that the consideration of greenhouse gases in EIA only became an express requirement in 2017. Furthermore, after discussion with the research steering group, a number of the potential case studies considered originally for inclusion, given their coverage of GHG emissions, were excluded as the EIA and / or consenting process had yet to be fully completed.

In addition to the fact that EIA practitioners are continuing to gain more experience in the assessment of GHG emissions impacts in EIA, It is also worth noting that:

- (i) The majority of the assessments completed post 2017 have made reference to IEMA's Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance. A working group has been set up recently to review and update the 2017 guidance, which is expected to provide more examples of practical tools for quantifying GHG emissions.
- (ii) Work to further quantify GHG emissions targets at a regional or local authority level, driven in part by the recent and widespread declaration of climate emergencies, is likely to enable greater quantification of GHG emissions at a project level, as there will be more meaningful benchmarks against which individual project performance can and will be judged.

There are two final points to consider with respect to the extent to which existing EIA requirements can contribute to understanding the impact of any development resulting from a Scottish Bill or statutory instrument on efforts to meet Scottish climate change targets, assuming that the quantification of emissions does improve as a consequence of wider policy and practice.

First, it can be hard to make a direct connection between Bills and statutory instruments and individual projects.

Secondly, theoretically, there is a risk of double counting, if GHG emissions are also being quantified at the SEA level. As the scope and geographical scale of SEAs varies considerably, this is more likely to occur where there are sector-specific SEAs, which have been undertaken over a relatively small geographical area, and corresponding

EIAs for major related infrastructure/development proposals. However, given the level of likely 'leakage' when it comes to recording development related GHG emissions, any double counting is unlikely to lead to an overestimate of Scottish GHG emissions.

In relation to this last point, it is important to note that a large proportion of planning applications (or similar) intentionally progress without undergoing EIA. This does not mean that environmental issues, including GHG emissions are not considered, as there are a range of other planning and regulatory mechanisms in place to ensure this. However, a focus solely on EIA data would inevitably leave a significant level of development related emissions unaccounted for.

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8 Appendices

8.1 Methodology

This appendix describes the project methodology including the identification of SEA and EIA case studies and the approach to consultation.

8.1.1 SEA and EIA engagement

The purpose of the engagement was to understand current assessment and reporting arrangements, to assist in identifying relevant guidance and potential case study SEA and EIA. A list of potential consultees from Scottish Government, including Energy Consents Unit, Transport Scotland and Marine Scotland, and SEPA was drawn up based on project team known contacts and informed by the project steering group. A summary of the project scope and a set of questions were emailed to the potential consultees and a written response or discussion were requested.

8.1.2 SEA engagement

Consultees were asked to respond on:

- The format and detail of greenhouse gas emissions data which would be most relevant to existing approaches to reporting;
- The key limitations or caveats associated with current approaches to collecting data and reporting greenhouse gas emissions;
- Identifying good examples of how greenhouse gas emissions have been considered in SEA;
- Identify any additional guidance documents on reporting greenhouse gas emissions in SEA.

Responses were provided from Scottish Government, SEPA and a local authority SEA practitioner.

8.1.3 EIA consultation

Feedback was requested in relation to:

- the challenges and limitations associated with current approaches to collecting data and reporting greenhouse gas emissions in EIA;
- any good practice EIA examples, particularly in terms of format and detail.

Responses were provided from leading EIA practitioners in Scotland and the UK, including those with international experience on climate change impacts.

No additional case study examples were identified, although the research team was made aware of a parallel research project being undertaken currently by Lancaster University on behalf of the Environmental Industries Commission (EIC) as part of the Commission's work on Net Zero infrastructure, and examining the 'effectiveness' of EIA climate change chapters in practice.

All those consulted expressed interest in the findings of this research project.

8.1.4 SEA Case study selection

SEA case studies were identified from a search of the Scottish Government SEA database, in parallel with the engagement work. At the time of the study the database was being updated and did not contain all recent information. It was therefore used to identify potential PPS which may only have been recorded as at Scoping stage within

the database but were then able to be located online. Any additional suggestions from the ongoing consultation exercise were also considered.

The case studies were selected as being within the last five years, covering a range of topics and including both local and national level examples, with a greater emphasis on local level examples as being more likely to consider GHG emissions impacts in detail where the plans themselves contain a greater degree of specificity. No regional level environmental report examples were identified within the relevant timescale.

The initial longlisting identified twenty examples. The majority of these fall under Section 5(3) of the 2005 Act, with only three Section 5(4) examples identified²⁴.

The longlist of potential case studies was evaluated in order to identify the coverage of GHG emissions in the baseline, the approach to SEA objectives, assessment criteria used, significance of effects, approach to alternatives, mitigation and monitoring.

The case study selection process reviewed the potential level of detail within the case study examples and sought to reflect a range of different topics. This included documents from a national and local level and across a range of topic areas including town and country planning, energy and climate change, transport, tourism, economy and forestry and woodland. The final case studies include:

1. Falkirk Local Development Plan 2, (2017)
2. Aberdeen Local Development Plan (2019)
3. East Renfrewshire LDP2 (2019)
4. Climate Fife – Sustainable Energy and Climate Action Plan 2020 – 2030 (2019)
5. Perth and Kinross Council Renewable and Low Carbon Energy Supplementary Guidance (2019)
6. Draft Climate Change Plan and Energy Strategy: joint strategic environmental assessment (2017)
7. East Lothian Local Transport Strategy (2018)
8. Cairngorm and Glenmore Strategy (2015)
9. Making Things Last: Consultation on a more circular economy in Scotland (2015)
10. Loch Lomond and the Trossachs National Park Trees and Woodland Strategy 2019 – 2039 SEA Draft Environmental Report (2019)

8.1.5 EIA Case study selection

The EIA case studies were initially identified from data obtained from the Institute of Environmental Management and Assessment (IEMA). This identified Environmental Impact Assessment Reports (EIA-Rs) produced by a range of environmental consultancies and completed between 2007 and 2020. An elimination process was carried out to identify potential case studies for the long list. This included the exclusion of EIA-Rs completed before 2017 and EIA-Rs (or ESs) which were produced for projects located in England, Wales and Northern Ireland. EIA-Rs which were produced by LUC were also excluded.

The Scottish Government confirmed that their EIA records no longer operate as a searchable database.

Additional potential case studies which fitted the selection criteria were identified as follows:

- Through an online search using the Google search engine. An initial search term of "EIA Chapter AND Climate Change AND Scotland" was used to identify standalone EIA-R chapters assessing climate change and greenhouse gas emissions.

²⁴ Section 5(4) plans can be considered in pre-screening and screening. Section 5 (3) plans require SEA and can proceed straight to scoping.

- On the basis of LUC's own knowledge of EIA projects undertaken in Scotland and through an email approach to LUC's existing contacts within the EIA profession in Scotland.
- Through the consultation process used to inform the research.
- By contacting the Development Management teams at a number of key authorities (Edinburgh, Glasgow and Highland Council in Inverness) to see if any further potential examples could be identified.

The process of identifying EIA case studies where GHG emissions had been quantified proved challenging, which is an important research finding in itself.

Inevitably, given that the updated requirements to address climate change in EIA were implemented in 2017, a number of the potential case study applications that were identified remain undetermined and as such were excluded from the list.

The initial search criteria did not yield enough case studies for the selection process. Following further discussion with the project steering group additional parameters to inform the case study selection included:

- Completed between 2014 and present;
- Consented;
- Including projects located in England, Wales and Northern Ireland.

This led to the identification of a longlist of case studies. The case studies were selected on the basis of a range of consenting regimes and topic coverage, and the following project shortlist was identified:

1. Benbrack Wind Farm S36c Variation (2019)
2. Cononish Gold Mine (2017)
3. Forth Replacement Crossing (2009)
4. Dell Wind Farm (2014)
5. Port of Cromarty Firth Phase 4 Development Invergordon Service Base (2017)
6. Cambusmore Estate (2019)
7. A90/A96 Haudagain Improvement Project (2015)
8. Leven Road Gasworks (2018)
9. A9 Berriedale Improvement Works (2016)
10. Madison Square Gardens, London (2019).

8.1.6 Review criteria

The criteria for reviewing the SEA and EIA case studies have been informed by findings from the review of guidance, the engagement findings and the longlisting process. Consideration of the benefits and limitations of each SEA Environmental Report was informed by the consultation authority responses to the Environmental Report.

Consideration of the benefits and limitations of each EIA was informed by consultation responses from the statutory consultees and the determining authority provided both at the EIA scoping stage, where relevant, and at the application stage, including within committee reports.

The review criteria for the SEA and EIA case studies are similar and included in Table A1:

Table A1: SEA and EIA review criteria

SEA review criteria	EIA review criteria
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What sources of GHG emissions have been identified in the baseline?	
How do the sources of GHG emissions identified relate to the scope of the PPS?	How does the source of GHG emissions identified relate to the nature of the project?
What quantitative information on GHG emissions is recorded in the baseline?	
What qualitative information on GHG emissions is recorded in the baseline?	
How is quantitative information on GHG emissions reflected in the SEA/EIA?	
How is qualitative information on GHG emissions reflected in the SEA/EIA?	
What is the approach to the justification of significant effects?	How has impact significance been determined against the baseline and with reference to policy and guidance?
How closely are the monitoring indicators linked to the SEA objectives and baseline?	
In summary, what are the benefits of the approach used?	
In summary, what are the apparent limitations of the approach used.	
If a tool has been used, which tool has been used	

8.2 Glossary

Assessment questions	Assessment questions can provide a systematic way of interrogating plan options. Questions can be developed on the basis of the analysis of relevant environmental protection objectives
Assessment matrices	Assessment matrices are one approach to undertaking an assessment. Assessment matrices are normally based on objectives, questions or environmental criteria. Scoring systems can be used in matrices to distinguish between the effects of different alternatives.
Baseline	This outlines the environmental characteristics of a receiving environment and provides the starting point for an assessment.
Climatic factors	This is one of the environmental topics required to be considered as part of the SEA and EIA processes.
Consultation authorities (SEA)	Public bodies, who because of their environmental responsibilities, are designated within the 2005 Act. The Consultation Authorities are; Historic Scotland, Scottish Natural Heritage (SNH) and The Scottish Environment Protection Agency (SEPA).
Cumulative effects	Effects which arise as a result of interaction between different components of a plan, or between the combined effects of plans.
EIA Report	A document or documents which sets out the developer's assessment of the likely effects of the project on the environment, including mitigation measures, and which is submitted in conjunction with an application for planning permission.
Environmental Impact Assessment	A process which identifies the environmental effects (both negative and positive) of development proposals.
Environmental Topic (SEA)	Although referred to as environmental issues within Schedule 3 of the 2005 Act, practitioners use a variety of terms to describe the different features of the

	environment that may be relevant in a SEA. Alternative terms include 'environmental receptor' and 'environmental indicator'.
Environmental report (SEA)	The publication used to set out relevant information emerging from the assessment. This includes background environmental information and context, a description of the plan being assessed, the significant environmental effects identified in the assessment. The Environmental Report is a key tool for early and effective engagement, and is not simply a compendium of all of the work undertaken in the earlier stages.
Monitoring	<p>This process ensures that SEA/EIA becomes an ongoing process of assessment and does not conclude on adoption of the plan or construction of a project.</p> <p>It is an important stage of the SEA /EIA process, as many environmental effects are uncertain and/or may only occur over the long term.</p>
Post-adoption SEA statement	This statement concludes the process by explaining how the SEA has helped to influence the content of the plan.
Pre-screening (SEA)	A process that enables quick elimination of plans which clearly have no or have minimal environmental effects from the full SEA process. It allows responsible authorities to focus SEA resources on plans which are likely to result in significant environmental effects.
Reasonable alternatives	The alternative approaches considered while developing the plan, which can be considered realistic. The potential scope for reasonable alternatives is heavily dependent on the plan and the options that are likely to be open to a Responsible Authority, in terms of delivering the main objectives or goals of the plan.
Responsible authority (SEA)	Any person, body or office holder exercising functions of a public character. Where more than one authority is responsible for a plan they should reach an agreement as to who is responsible for

	the SEA. Where an agreement cannot be reached, the Scottish Ministers can make the determination.
Schedule 1 development (EIA)	Development of a description mentioned in Schedule 1 of the EIA Regulations which always requires EIA.
Schedule 2 development (EIA)	<p>Development of a type listed in schedule 2 to the EIA Regulations which:</p> <ul style="list-style-type: none"> - Meets any relevant criteria and exceeds any relevant thresholds in the second column of schedule 2; or - Is located wholly or in part in a 'sensitive' area as defined by the EIA regulations. <p>Such development requires case by case screening to determine whether an EIA is required.</p>
Scoping Opinion (EIA)	The planning authority's formal opinion on the information to be supplied in the EIA Report. Under some circumstances (e.g Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017) a scoping opinion can be made by Scottish Ministers where they are not the planning authority, and the planning authority cannot make its own scoping opinion.
Scoping Report (SEA)	Produced by a Responsible Authority, it should set out, as a minimum, the proposed level of detail to be included within an Environmental Report, along with the estimate consultation periods.
Screening (SEA)	A process that explains whether a plan is likely to have significant environmental effects. It also provides the statutory Consultation Authorities with an early opportunity to get involved and highlight areas of concern and offer advice, if necessary.
SEA Objectives	The review of relevant environmental objectives can be used to construct a framework of objectives against which a plan can be assessed
Significant environmental effects (SEA)	Schedule 2 of the 2005 Act sets out specific criteria for determining the likely

	significance of environment effects of a plan. The need for an assessment can be triggered by either be positive or negative effects, providing they are significant.
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