

STRIVE

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Strategic Environmental Assessment – Alternatives Development for Household Waste Management

STRIVE

Environmental Protection
Agency Programme

2007-2013

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EPA STRIVE Programme 2007–2013

Strategic Environmental Assessment – Alternatives Development for Household Waste Management

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STRIVE Report

Prepared for the Environmental Protection Agency

by

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The EPA STRIVE Programme addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in relation to environmental protection. These reports are intended as contributions to the necessary debate on the protection of the environment.

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Executive Summary

1 Introduction

The development of decision criteria and a decision-support framework for alternatives within environmental planning has been undertaken to assist practitioners to meet their obligations under the EU Strategic Environmental Assessment (SEA) Directive (2001/42/EC) (European Commission, 2001) and Irish environmental regulations.

This work is one of a number of projects funded by the Environmental Protection Agency (EPA) under the Environmental Research Technological Development and Innovation (ERTDI) Programme (2000–2006) to work on different aspects of the SEA methodology. The primary aims of the research are to develop guidance on the identification and development of alternatives within SEA for use in land-use planning and waste management planning. Specifically, this involves:

1. The development of generic alternatives decision criteria
2. The development of alternatives decision-support framework, and
3. Application of the approach to waste management planning.

This work represents an original piece of research based entirely on the Irish experience of SEA within different sectors and tiers of environmental decision making. The findings of this research have a wider application to the International impact assessment community.

The methodology that was used in the development of criteria for setting SEA alternatives in this research included a number of phases:

1. An assessment of criteria as set out under the EU SEA Directive, national legislation and guidelines was undertaken
2. An assessment of a sample set of SEAs in Ireland

to determine criteria currently in use was conducted

3. A questionnaire of potential criteria was circulated to all SEA practitioners (consultants and local authority staff) active in Ireland during the research period
4. Face-to-face interviews were conducted with a sample set of SEA professionals, responsible authorities and statutory consultees to elicit views on existing and potential criteria and to comment on a proposed decision-making framework, and
5. Assessment of the approach in the context of waste management planning.

The methodology allowed the author to determine how alternatives are currently being dealt with in an Irish context and how this might be improved in light of growing familiarity with the SEA approach. In particular, the questionnaire follow-up of detailed semi-structured interviews with some of the more experienced planners and practitioners was extremely useful and facilitated the interrogation of the need for guidelines, the need for decision criteria and the shape that a decision-making framework should take. The methodology was initially developed within the context of land-use planning and was subsequently applied to waste management planning.

The main outputs from the research are:

1. Alternatives development criteria
2. A decision-support framework
3. Peer-reviewed journal publications, and
4. Dissemination through undergraduate teaching, international and national conferences, research seminars and local authority presentations.

In addition the research has also given rise to networking, teaching and project participation opportunities.

2 The Role of Alternatives in the SEA Process

One of the original reasons for the development of the SEA process was to enable the consideration of alternatives at the strategic level (Sadler, 1996). If a vision or set of goals exists for a policy, plan or programme, it is possible to intervene and evaluate alternatives to select the appropriate direction that will most likely reach the desired vision (Noble, 2000). As SEA considers the longer-term and larger-scale plans, it can give proper consideration to different ways of achieving certain visions, goals, aims and issues (Jones *et al.*, 2005; Fischer, 2007). While the development of alternatives is a legal requirement under the SEA Directive, Noble (2000) further argues that the formulation of alternatives is a core activity in the achievement of sustainable development. Thus, the development of reasonable alternatives within a participatory process is central to the aims of SEA. In setting out a criterion-based decision-making approach the sustainability approach to SEA is enhanced.

3 Development of Decision Criteria and a Decision Framework

Within SEA the consideration of alternatives follows a two-step process:

1. The identification/development of alternatives
2. The assessment of the environmental effects of the chosen alternatives.

In this project, the emphasis has been on the establishment of SEA-specific decision criteria for the identification of alternatives, to be applied to both land-use planning and waste management in Ireland.

4 General Conclusions

Utilising a structured, criteria-based approach to the development of alternatives within SEA leads to the generation of options that not only satisfy the requirements of the Directive, but also meet international and national standards. Perhaps, more importantly, in following the approach set out, opportunities now exist to enhance the central aim of SEA: the achievement of sustainable development through the integration of environmental

considerations into plan and programme making. In addition, in utilising this transparent and user-friendly approach, the potential for environmental conflict should be mitigated because the underlying reasons for making particular decisions should become apparent.

5 Recommendations

- It is recommended that the criteria-based approach should be used by SEA practitioners in the development of alternatives for any number of environmental-planning and decision-making sectors. This should include the use of the decision-making criteria and supporting decision framework to assist in the development of 'real' alternatives, all of which are equally robust and valid.
- It is further recommended that the criteria could be used as a simple tool to interrogate and assess the quality and authenticity of alternatives developed. In so doing this would ensure that not only would all of the alternatives developed within any given plan or programme meet the requirements of national legislation and the SEA Directive, but they would equally be understood as genuine options and not simply add-ons.
- Finally, it is further recommended that the approach should be incorporated into any revisions that might be made of national SEA guidelines.

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1 Introduction

Strategic Environmental Assessment (SEA) is an important tool for integrating the environment into decision making (Sadler and Verheem, 1996; Sheate *et al.*, 2003) and, as such, offers a promising approach towards achieving the goal of sustainable development (Therivel and Partidario, 1996). Specifically, SEA seeks to inform the decision maker of the degree of uncertainty over impacts, the level of consistency in objectives (plan and environmental), the sensitivity of the baseline and the range of plan or programme alternatives available.

Alternatives are options, choices, or courses of action; they are means to accomplish particular goals (Steinemann, 2001). Specifically, they are the means of achieving the central aims of SEA, which is to provide for a high level of environmental protection and to integrate environmental considerations into the decision-making process.

In order to determine if the central aims of SEA are being incorporated into the development of alternatives, decision-making criteria must be used which will assist in the integration of environmental considerations into plan making. While there is no currently available methodology for the identification of alternatives in SEA, this research project sets out a criteria-based approach which is designed to assist practitioners develop a set of alternatives for a plan or programme.

Specifically, this will begin with a theoretical description of rational decision making, which will initiate the process of identifying criteria established in the decision-making sciences. Following from this, the identification of alternatives within SEA will be briefly discussed and shortcomings identified. Based on land-use planning, a methodology is set out describing how a set of alternatives identification criteria was initially developed. Following from this, an approach comprising a set of criteria and a decision-support framework are set out. The approach is then applied to waste management planning in Ireland with a view to determining its applicability. Finally, some conclusions

and recommendations are made for the future and prospects of the research.

While the decision-based approach has been the main output from this research project, it has also given rise to a number of other outputs, including:

1. A number of publications ([Appendix 1](#))
2. Dissemination of findings through conferences, seminars, presentations and lectures ([Appendix 2](#)), and
3. Additional outputs from the research ([Appendix 3](#)).

1.1 Rational Decision Making

In an effort to theoretically ground the notion of alternatives development, the literature of the decision-making sciences have been drawn on in this project. In this respect, attention has been paid to the insights offered by the structured approaches to problem solving, which are viewed by some as one of the most important activities in the decision-making process (Perry and Moffat, 1997; Corner *et al.*, 2001). However, it is worth noting that such approaches are seen as inconsistent with the realities of policy, plan and programme decision making by many commentators (Weston, 2000; Benson, 2003; Bond, 2003). For example, Nitz and Brown (2001) argue that the rational decision-making approach is not reflective of policy-making procedures and is unrealistic in its assumptions of objective rationality.

Structured decision making is an organised process for engaging multiple stakeholders in a productive decision-oriented dialogue that considers both facts and values (Failing *et al.*, 2007). It relies on the principles and tools of decision analysis, the core elements of which include defining objectives and measures of performance, identifying and evaluating alternatives, and making choices based on a clear understanding of uncertainties and trade-offs (Keeney and Raiffa, 1976; Henig and Buchanan, 1996; Hammond *et al.*, 1999).

Participants begin by structuring a problem in terms of a small set of relevant issues and interests (Keeney, 1992). These are defined in terms of explicit objectives or end points of concern and performance measures are identified for each. Performance measures (also termed performance criteria, indicators or attributes) are the specific metrics used to track the extent to which objectives are satisfied by the alternatives (Gregory and Keeney, 1994). They are the criteria used to compare and evaluate alternatives and allow rational choices to be made between them. Multi-objective and multi-attribute decision-making methods (Keeney and Raiffa, 1993) are at the core of the structured decision-making approach.

When combined Multi-Objective Decision-Making (MODM) and Multi-Attribute Decision-Making (MADM) methods provide a useful and structured framework (Kok and Lootsma, 1985; Kok, 1986) for the generation of alternatives based on the identification of components of objectives and attributes (Henig and Buchanan, 1996). The main goal for the plan or programme is firstly disaggregated into objectives and sub-objectives and secondly into attributes to measure the performance of alternatives in relation to the objectives (Malczewski, 1999). The identification of key objectives is an essential precursor to alternatives generation (Keeney, 1992). The tabulation of objectives and sub-objectives can be represented in a hierarchy or value tree (Keeney and Raiffa, 1976; Keeney, 1992), which provides a simple visualisation tool of what matters in a particular decision context.

An attribute or performance measure for reporting progress is identified for each lower-order objective (sub-objective). Attributes clarify the meaning of each objective and are required to measure the consequences of different alternatives (Keeney and Gregory, 2005). Attributes also provide a means for consistent comparisons across alternatives, which means that hard-to-quantify impacts can be included in the evaluation framework on an equal footing with more quantitative impacts (Failing *et al.*, 2007).

Based on the objectives identified for the issue under consideration, participants then identify alternatives (Gregory and Keeney, 1994). Each alternative is evaluated against the attributes with respect to the

objectives (Failing *et al.*, 2007). To facilitate the organisation of objectives, attributes and alternatives, a consequence table can be constructed. Using the framework a set of well-differentiated alternatives should emerge (Henig and Buchanan, 1996). These alternatives should present high potential value and they should be realistic.

In addition, the framework might also be usefully used when developing alternatives across different tiers or levels of decision making. Hwang and Yoon (1981) argue that MODM methods are most applicable to a continuous domain of infinite or large number of choices, to best satisfy the decision-making constraints, preferences or priorities. Multi-Attribute Decision-Making methods are more applicable within discrete domains where alternatives that require attribute comparisons, involving implicit or explicit trade-offs, are usually limited and often pre-specified. Thus, at different levels or tiers of decision making varying aspects of the structured decision-making framework might be more or less applicable.

The structured decision-making approach provides useful insights into the systematic identification and development of alternatives for SEA. As the approach provides a framework for identifying alternatives whose performance can be measured, this allows for the development of 'reasonable' alternatives, i.e. alternatives that are context specific, issues driven and participatory where multi-objectives are central and trade-offs made explicit.

The objectives and evidence-based approach to structured decision making is in keeping with the recommendations and orientations of Sheate *et al.* (2001), Pope *et al.* (2004) and Fischer (2007) to SEA decision making. The definition of context-specific issues and the systematic identification and interrogation of relevant objectives is important in the context of SEA. In the face of competing interests and values of the multi-stakeholders involved in SEA, the systematic identification and ranking of objectives could be very useful where trade-offs might be necessary.

The assessment of the 'performance' of the alternatives element of the framework is of use in the SEA context in that it provides an early indication of the

impacts of certain actions, i.e. it can begin to diagnose potential issues that might arise from certain alternatives. This aspect is in keeping with the future proofing orientation of SEA.

The framework provides useful insights into the issue of tiering within SEA. In particular, the approach suggests that as one moves up the decision-making process from project level to plan and policy levels the 'type' of alternative changes from discrete, well-defined alternatives to more vague and broadly defined alternatives, which can be interrogated using MADM/MODM approaches. In a similar fashion,

Fischer (2007) argues that the form and number of alternatives available in the policy context are quite different from those available at the project level.

Overall, it seems that the theoretical and procedural insights of the decision-making literature provide a useful mechanism for the identification and development of SEA alternatives. It also sets out what could usefully be described as criteria that should be included in the development of alternatives: objectives, decision context (existing issues), tier of decision making, and participation.

2 Strategic Environmental Assessment

Since 21 July 2004, SEA is required under Directive 2001/42/EC for the assessment of the effects of certain plans and programmes on the environment in all European Union Member States. The aim of the SEA Directive is to help protect the environment and promote sustainable development by integrating the environment into decision making. Regarded as the ‘big brother’ of environmental impact assessment (EIA) (Fischer, 2002), SEA involves predicting, evaluating and mitigating the environmental impacts of policies, plans and programmes and their alternatives, and thereby integrating environmental considerations into strategic decision making.

While SEA is broadly defined as the environmental assessment of policies, plans and programmes, there are several definitions (Therivel and Partidario, 1996; Brown and Therivel, 2000) stemming from differing ideas on its role and purpose (Sheate *et al.*, 2001), and

the fact that it is still evolving (Marsden and Dovers, 2002). One of the more widely used definitions is that:

“SEA is a systematic process for evaluating the environmental consequences of proposed policy, plan or programme initiatives in order to ensure they are fully included and appropriately addressed at the earliest appropriate state of decision making on par with economic and social considerations.”

(Sadler and Verheem, 1996, p. 27)

Briefly, SEA is an impact assessment approach, which is applied to plans and programmes. The SEA methodology (Fig. 2.1) ensures that the likely consequences of implementing plans and programmes are identified and assessed during the plan-making process and before their adoption. Environmental consultees and the public are invited to comment during the scoping phase, on release of the draft policies, plans and programmes and in transboundary situations. The results of such

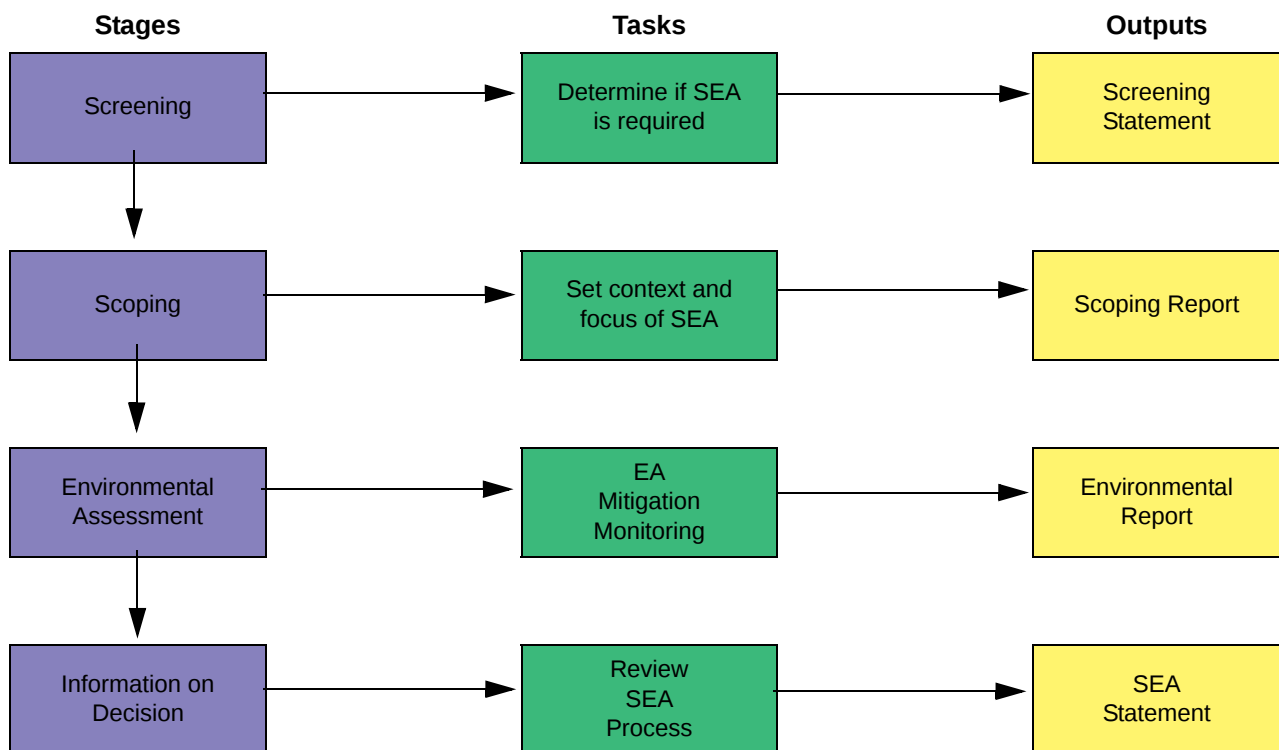


Figure 2.1. Strategic Environmental Assessment (SEA) methodology – key stages, tasks and outputs.

consultation are taken into account when decisions are being made on the adoption of the plan. Once the plan or programme has been adopted the public is informed about the decision and the way in which it was made. Arrangements are also made to put in place a monitoring programme for the plan. Accordingly, under best practice, the plan making and the SEA process are conducted in parallel and inform each other on a variety of issues, including the development and choice of alternatives, the choices of environmental objectives, targets and indicators, and facilitate environmental monitoring of the effects of implementing the plan.

2.1 Strategic Environmental Assessment in Ireland

Prior to the implementation of the SEA Directive no formal provisions for the approach existed in Ireland (Scott, 2005); however, it was anticipated through a number of environmental policy documents. For example, the policy document *Making Ireland's Development Sustainable* (DoELG, 2002a) set out to establish a SEA system for plans and programmes in Ireland, while the strategic appraisal of land-use plans was anticipated in the Planning and Development Act, 2000 (Government of Ireland, 2000). The significance of SEA was further recognised in the *National Spatial Strategy* (DoELG, 2002b), where its role is seen as pivotal in ensuring that environmental issues are integrated into the implementation of the strategy.

The SEA Directive was transposed directly into Irish law in 2004 to ensure that all substantive and procedural requirements of the Directive were met, through two sets of instruments:

1. *European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004* (SI 435 of 2004)
2. *Planning and Development (Strategic Environmental Assessment) Regulations 2004* (SI 436 of 2004).

In addition to providing the legal framework for the SEA Directive in Ireland, Government departments, agencies and local authorities have prepared guidance documents for its implementation. For example, the Department of the Environment, Heritage and Local

Government (DoEHLG) published a guidance document for regional authorities and planning authorities in relation to land-use planning titled *Implementation of the SEA Directive (2001/42/EC): Assessment of Effects of Certain Plans and Programmes on the Environment* (DoEHLG, 2004a); however, no other separate guidance documents currently exist for other sectors. The Environmental Protection Agency (EPA) produced the *Development of Strategic Environmental Assessment Methodologies for Plans and Programmes in Ireland* (2003), and Cavan County Council has also produced a guidance document on SEA legislation and procedures for planning authorities (Cavan County Council, 2006). In addition the EPA through its website provides links to a range of SEA-related information, such as statutory consultee contact details (EPA, DoEHLG, Department of Communications, Marine and Natural Resources (CMNR)), methodology guidance documents, environmental issues, environmental objectives and possible indicators.

Strategic Environmental Assessments have been completed in Ireland across a number of sectors (land use, water, waste, energy), through different tiers of decision making and by a combination of planning authorities and consultants (Desmond, 2007a). However, a number of challenges remain in relation to the SEA process in Ireland, including development of alternatives, prediction and evaluation, additional impacts, mitigation and monitoring (Scott, 2005; Desmond, 2007a).

The approach to handling alternatives in Irish SEAs has begun to evolve from screening out at an early stage in the planning process those with potential environmental impacts and assessing only the preferred environmental option (Scott, 2005). As experience and confidence have grown, a range of alternatives is now being suggested in most land-use plans from which the best environmental option is assessed and identified. However, it is not altogether clear if each of the alternatives identified is equally capable of meeting plan and SEA/environmental objectives. To determine if the alternatives being proposed in Irish SEAs are equally robust a set of criteria and a decision-making framework have been developed in this project ([Chapter 4](#)).

3 Alternatives in Impact Assessment

The consideration of alternatives is an essential element of the impact assessment process (Jones, 1999) and has further been described as the 'heart' of EIA (Council for Environmental Quality, 1987). However, the consideration of alternatives within EIA has been severely critiqued (Steinemann, 2001) because traditionally by the time plans for an individual project are suggested there is little opportunity for considering alternatives to the proposal, which have effectively been 'foreclosed' (Lee and Walsh, 1992). Accordingly, the consideration of alternatives at lower levels within the decision-making process does not give rise to strategic decisions. In contrast, the development of alternatives at the higher levels of plan and programme should theoretically provide opportunities to address shortcomings and lead to more sustainable decision making.

3.1 Strategic Environmental Assessment Alternatives

One of the original reasons for the development of the SEA process was to enable the consideration of alternatives at the strategic level (Sadler, 1996). If a vision or set of goals exists for a policy, plan or programme, it is possible to intervene and evaluate alternatives to select the appropriate direction that will most likely reach the desired vision (Noble, 2000). As SEA considers the longer-term and larger-scale plans, it can give proper consideration to different ways of achieving certain goals and aims (Jones *et al.*, 2005). Sometimes referred to as the 'objectives-led' approach to SEA (Sheate *et al.*, 2001, 2003; Partidario, 2003; Esson *et al.*, 2004), alternatives can be future orientated and closely linked to achieving enhanced sustainability. In contrast alternatives within a 'baseline-led' approach to SEA (Sheate *et al.*, 2001, 2003) are more concerned with baseline environmental issues. While this would suggest an either/or approach, in reality as Smith and Sheate (2001) argue there is a case to be made for viewing the objective-led and baseline-led approaches as complementary, which would suggest that alternatives

should be able to both deal with existing problems and/or meet a plan or programme's vision or objectives.

However, the SEA Directive does not specify whether alternative plans or programmes or different alternatives within a plan or programme are to be considered. Noble (2000) suggests that alternatives can in practice be grouped into:

- Alternatives that meet a need or address a specific problem
- Alternatives to a proposed policy/plan/programme
- Alternatives to an existing policy/plan/programme.

At higher levels of decision making alternative policies can be assessed, while at lower levels of decision making different alternatives within a plan or programme will usually be assessed (e.g. different means of waste disposal within a waste management plan, or different ways of developing an area within a land-use plan), rather than alternatives to the plan itself (Jones *et al.*, 2005). However, as Noble (2000) argues, there are in effect no specific 'types' of alternatives that must be included in SEA.

The formulation of alternatives is a core activity (Noble, 2000) in the achievement of SEA goals of environmental protection and in the integration of environmental considerations into sector policy, plan and programme making. In addition, the process must also be able to generate a wide range of possible means of achieving a plan's objectives and present a comparative assessment of the most reasonable alternatives (Jones *et al.*, 2005; ODPM, 2005). Alternatives allow decision makers to take into consideration an extreme option, which can be useful for providing the range of discussion (Therivel, 2004). The consideration of different alternatives for the plan or programme also provides a means to document the decision-making process, promotes transparency and helps to create a visible audit trail.

The consideration of alternatives is a legal requirement of the SEA Directive (2001/42/EC) (see [Box 3.1](#)). In particular the Directive requires that the environmental report should consider “*reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme*” and give “*an outline of the reasons for selecting the alternatives dealt with*” (Article 5.1 and Annex I (h)).

According to the EU guidance document on the implementation of the SEA Directive (EU, 1999), the obligation to identify, describe and evaluate reasonable alternatives must be read in the context of the objective of the Directive, which is to ensure that the effects of implementing plans and programmes are taken into account during their preparation and before their adoption. The text of the Directive does not say what is meant by a reasonable alternative to a plan or programme. However, in the United States the National Environmental Protection Act (NEPA) understands reasonable alternatives to be technically and economically feasible, and stemming directly from a solid and legitimate statement of purpose and need (Smith, 2007). O'Brien (2000) argues that reasonable alternatives can be defined as those already in use or practice, having been brought to the attention of an individual or agency, or having been known to that party. Under the Irish SEA planning guidelines (DoEHLG, 2004a) it is argued that alternatives must be realistic and capable of implementation, and should represent a range of different approaches within the

statutory and operational requirements of the particular plan.

For some commentators, a distinction is made between the consideration of alternatives and options, which are viewed as playing different roles in SEA (Noble, 2000; Steinemann, 2001). Unlike EIA, in SEA the focus is on identifying alternative options and opportunities for regions and sectors rather than on identifying the potential outcomes of options to a predetermined alternative (Noble, 2000).

3.2 Alternatives and Options

While some SEA guidelines do not differentiate between alternatives and options (EPA, 2003; DoEHLG, 2004a; ODPM, 2005), it is worth noting that the two terms are not regarded as synonymous by other commentators (Noble, 2000; Steinemann, 2001), which have different implications when used in environmental assessment (Jones, 1999; Sheate *et al.*, 2005). For example, Wood (1995) makes the distinction between ‘alternative means’ and ‘alternative to’. ‘Alternative means’ of carrying out a project are methods of a similar technical character, while ‘alternatives to’ are functionally different ways of achieving the same end (Wood, 1995).

Some alternatives are discrete, self-contained packages (Therivel, 2004). For example, decision makers need to choose one option from a limited set, such as waste management alternatives suggested by the waste hierarchy (Therivel, 2004). The choice of an

Box 3.1. Specific requirements for the consideration of alternatives under the SEA Directive.

- Consider the likely significant effects on the environment of implementing the plan or programme, and reasonable alternatives
- Account for the objectives and geographical scope of the plan or programme
- Identify, describe and evaluate reasonable alternatives
- Provide information on the reasons for selecting the alternatives dealt with
- Provide information on the assessment of the alternatives including any difficulties (including technical deficiencies or lack of know-how)

Source: SEA Directive

Box 3.2. Different types of alternatives.

- At the top level (programme or policy), various approaches and alternatives are open for consideration
- At the planning level, alternative locations and capacities are open to consideration
- At the project level, design and mitigation options are available

(Therivel and Partidario, 1996)

alternative from a set represents a strategic course of action, which has been referred to by Noble (2001) as a choice from 'alternative options'. Options are in contrast a mix and match of combinations of individual components of a strategic action, i.e. the choice could be between A and/or B and/or C (Therivel, 2004). Following Noble (2001), options are generally chosen as a result of a pre-determined alternative and can be referred to as 'option alternatives'. Based on these definitions, alternatives should be considered as higher-level decision-making mechanisms, while options are based on the predetermined alternative and represent option alternatives and occur at lower levels of decision making. For example, if the chosen alternative for waste management is waste reduction, the options available are recycling, composting and reuse. Clearly, based on this, the issue of alternatives within a tiered decision-making process cannot be ignored.

3.3 Alternatives and Tiering

Just as the scope of SEA will differ according to the level of application (policy, plan or programme) (Noble, 2000), so too does the type of alternative vary according to the tier of decision making (Box 3.2). The SEA of alternatives for a national energy policy, for example, will have a broader focus than the SEA of alternatives for a regional energy efficiency programme (Noble, 2000).

Thus, different types of alternatives exist at different tiers of decision making (Therivel, 2004). To conceptualise this, a hierarchy of alternatives may be considered for key plans or programmes (ODPM, 2005) (Fig. 3.1).

The hierarchy ranges from the alternatives available at uppermost strategic decision-making levels of policy and national planning to the more detailed and less strategic alternatives available at the programme/

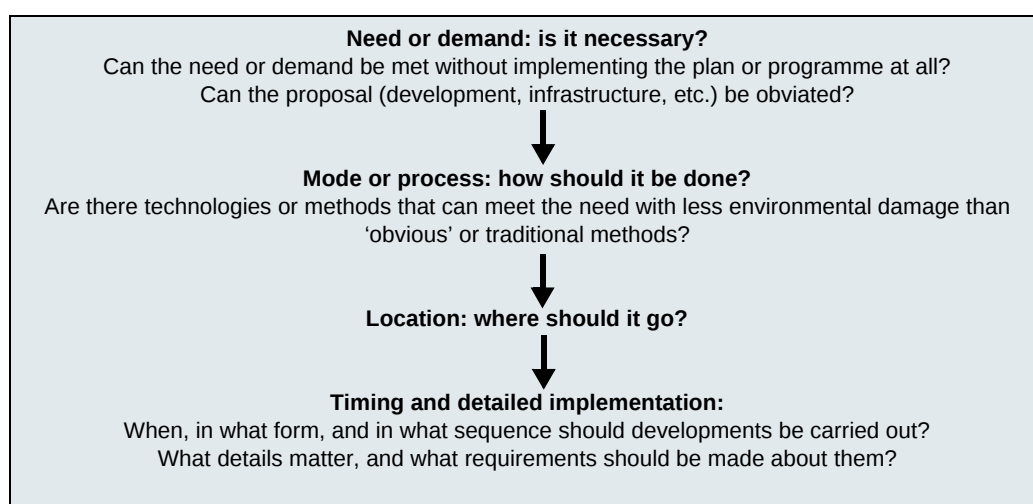


Figure 3.1. The alternatives hierarchy (ODPM, 2005).

project and local site levels (Therivel, 2004). As the ODPM (2005) argues, not all of the alternatives are available in all situations, for example demand reduction measures are often outside the control of a responsible authority, whereas the location of specific pieces of infrastructure is not of concern to a national strategic plan. For example, a national waste strategy is not concerned with the location of bring banks or the timing of waste collections. A wider range of alternatives will be available to national or regional plans than at county or local level as decisions made at the higher levels in the decision-making process will close off some alternatives. Nevertheless, 'up-the-hierarchy' thinking could suggest a wider and more sustainable range of alternatives than hitherto considered (ODPM, 2005, p. 69).

While the alternatives hierarchy provides a useful conceptual tool for visualising the types of potential alternatives available to different layers of decision making, in environmental planning a clear delineation between tiers of planning is often not the reality (Noble, 2000). In many instances plans contain policies and programmes and *vice versa*. For example, in Ireland, County Development Plans contain both policies and plans for land-use planning. However, one of the key strengths of the Irish land-use planning system is that a clear hierarchy of plans exists that allows the

transposition of national spatial planning policy (National Spatial Strategy, 2002) to the regional level (*via* Regional Planning Guidelines) and hence to county and local levels (Scott, 2005). Based on this hierarchy it is suggested here that a clear link can be made between the alternatives hierarchy (ODPM, 2005) and the hierarchy of land-use decision making (Fig. 3.2).

At the level of policy the alternatives available focus on overall objectives and values and relate to needs and demands. At this level, the alternatives are non-spatial in character (Fischer, 2002) and focus on setting directions or visions for lower-level plans, programmes and projects. However, it should be noted that the notion of 'need' is not straightforward and full consensus about it may not exist (Owens, 2004). At the level of plan making, the orientation is towards the realisation of action, where development might be located, and settlement densities. At this level, the focus is generally on spatial alternatives (Fischer, 2002). At the programme level, the focus is on the choice of projects within a programme and is concerned with both location and timing.

In principle, as Scarse and Sheate (2002) argue, a good environmental assessment at a high level in the hierarchy should facilitate assessment at lower levels

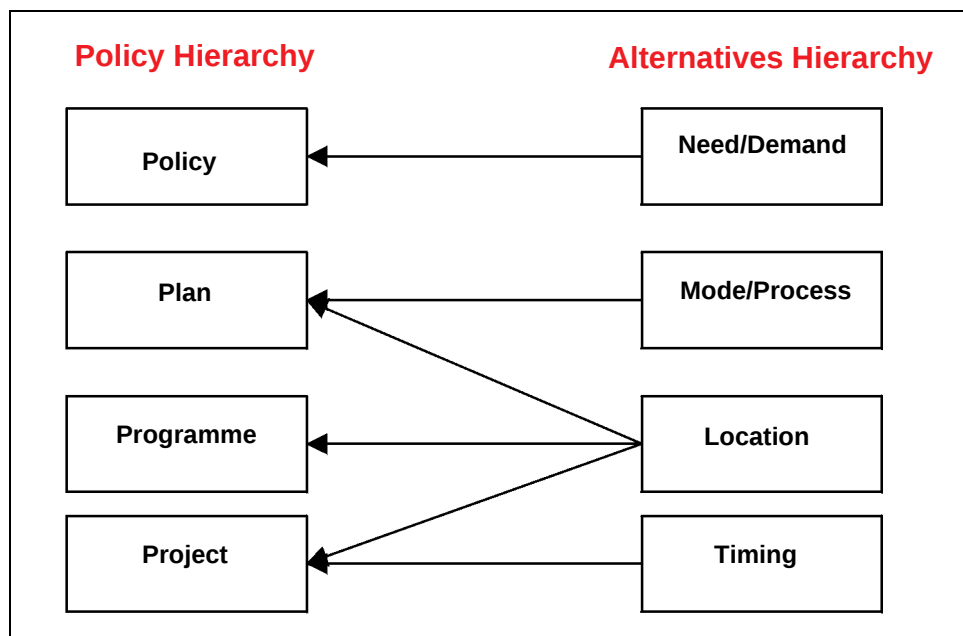


Figure 3.2. Policy and alternatives hierarchy.

as broad issues will already have been addressed and attention can focus on issues of immediate and local relevance. Similarly, in an earlier study, Nootboom (2000) noted that SEA refines the scope of assessments at lower tiers.

It should, however, be noted that the notion of tiering within policy decision making is not without its challenges (Noble, 2000). While the reasoning behind the concept of tiering is sound, in contexts where matters of principle such as need are not open to wide social debate, there is a risk that the concept will be used to justify the removal of need at the level of specific proposals (Scarse and Sheate, 2002). Owens (2004) argues that it is problematic to think that the case for development can be settled in principle at the higher level of decision making and thus eliminating controversies at lower decision-making levels. Thus, the notion of path dependency is an issue in this context.

Path dependency within a tiered decision-making hierarchy refers to the way in which policy decisions create a context for subsequent decisions, and thereby

create a certain path dependency, reinforcing the likelihood of similar decisions in the future (Scarse and Sheate, 2002). In order to understand the notion of path dependency in relation to the development of alternatives, the formulation of alternatives must be considered in the context of an historical policy trajectory that has set out the future orientation or vision. In this understanding “*the focus is on paths, not places*” (Noble, 2001, p. 18). Based on this, options within the chosen pathway can begin to be formulated.

While the SEA regulations and guidelines emphasise rigour and objectivity in the assessment of alternatives, they have little to say on their actual development. Thus, criteria need to be put in place which should aid decision makers in the development of alternatives appropriate to the tier of decision making and able to meet the central goals of SEA. The development of criteria for use in the identification of alternatives has been conducted in Ireland and, as such, is strongly influenced by the demands and constraints of the country’s SEA process and environmental planning systems.

4 Alternatives Development Methodology

The methodology used in the development of criteria and the decision-making framework was conducted in two phases. In Phase 1 the criteria for decision making were established and in Phase 2 these criteria informed the development of the decision-making framework. The methodology was initially developed for land-use planning and subsequently applied to waste management planning. Due to the timing of the research no waste management plans at any decision level had been subjected to SEA in Ireland. However, by the end of the project the SEA of the *National Hazardous Waste Management Plan* had been completed to draft stage, the findings of which subsequently informed the final stage of the project.

The development of the decision criteria for SEA alternatives in this project followed a number of steps, including:

1. An assessment of criteria as set out under the EU SEA Directive, national legislation and guidelines was undertaken
2. An assessment of a sample set of SEAs in Ireland to determine criteria currently in use was conducted
3. A questionnaire of potential criteria was circulated to all SEA practitioners (consultants and local authority staff) then active in Ireland, and
4. Face-to-face interviews were conducted with a sample set of SEA professionals, responsible authorities and statutory consultees to elicit views on existing and potential criteria and to comment on a proposed decision-making framework.

4.1 Development of Alternatives Methodology

4.1.1 Assessment of EU Strategic Environmental Assessment Directive, national legislation and existing guidelines

The first task in the development of the criteria was to determine those suggested by the SEA Directive, national legislation and existing guidelines. The Directive is not prescriptive on how alternatives should be developed, suggesting only that:

- The objectives of the plan or programme must be considered, and
- The geographical scope of the plan or programme must be considered.

Similarly, national legislation (SIs 435 and 436) set out the same two sets of criteria. Beyond this limited set, a more robust set of criteria is set out in SEA guidelines (DoEHLG, 2004b; ODPM, 2005). Based on an assessment of national and international guidelines (Table 4.1) additional SEA criteria include consultation, acceptability, legality, reasonableness, realism, relevance and hierarchy of options. However, it should be noted that the guidelines do not define or explain what is meant by any of these criteria. For example, in relation to consultation it is not clear if this means consultation with statutory consultees or with the general public; in relation to acceptability it is not clear who the alternative should be acceptable to; in relation to reasonableness it is not clear if it means technically, economically, socially or politically reasonable. In addition it is not clear from this set which criteria might

Table 4.1. Guidelines on alternatives criteria (PP, plan or programme).

Directive	Legislation	EPA	DoEHLG	ODPM
PP objectives	PP objectives	Broaden PP objectives	Realistic	Reasonable
Geographic scope of PP	Geographic scope of PP	Consultation	Implementation	Realistic
		Acceptability	Statutory requirements	Relevant
		Legality	Operational requirements	Hierarchy of options

Source: SEA Directive, Irish SEA Legislation, EPA, DoEHLG and ODPM guidelines.

be more appropriate to which tier of decision making or if they are all equally useful.

4.1.2 Alternatives criteria used in Irish Strategic Environmental Assessments

An assessment was undertaken of a sample set of 14 SEAs in Ireland to determine the criteria being used in the development of alternatives in practice at the time of the research (Table 4.2).

The SEAs assessed were conducted in the context of different sectors and tiers of decision making. In the sample, 12 of the SEAs were from land-use planning and one each from water and waste planning. However, at the time of the research, plans at lower levels (County Development Plans and downwards) of the decision-making hierarchy had only been subject to SEA. The land-use plans used in the study comprised one County Development Plan, 10 Local Area Plans, and one Master Plan. From other sectors, one Regional Waste Management Plan (RWMP) and one county-level Water Plan were used.

From the assessment of alternatives within the plans additional criteria used included context of higher plans, adherence to planning principles, existing environmental issues, policy context, economic costs, and environmental impacts.

Based on this assessment some observations can be made. First, as would be expected, a certain amount of crossover was observed between the sets of criteria such as 'meet plan/programme objectives', 'consultation', 'legality', 'realistic', 'capable of being implemented', 'meet statutory requirements' and 'meet operational requirements'. Second, while a number of

different criteria are currently being used for the development of alternatives, there is no obvious pattern or core set being applied. Third, the two main SEA objectives, environmental protection and the integration of the environment into decision making, are not being achieved through the current lists. Thus, it would seem that specific SEA criteria must be included, which can lead to the achievement of these objectives.

4.2 Identifying Additional Criteria for Strategic Environmental Assessment-Specific Alternatives Development

Based on the specific goals of SEA, core research publications (see above) and the earlier assessments (see above), the additional criteria listed in Table 4.3 are suggested for the development of alternatives.

Accordingly, a full set of alternatives development criteria might include some or all of the following depending on the sector, level of decision making and purpose of the alternatives (achieve a future vision, and/or respond to existing issues) (Table 4.4).

4.3 Questionnaire Survey

4.3.1 Method

Once the potential list of criteria had been devised, it was then circulated to all practitioners in Ireland who had been involved in the SEA process since 2004. Based on a full list of completed SEAs in Ireland supplied by the EPA (statutory consultee), an initial set of respondents was identified. This list was later expanded for the waste management element of the study. The questionnaire was initially forwarded to

Table 4.2. Criteria used in environmental reports to date.

Sector and tier of decision	Criteria
Land-use planning: 1 County Development Plan	Realistic, implementation, statutory and operational requirements, context of higher plans
Land-use planning: 10 Local Area Plans	Planning principles, significant issues, plan objectives, statutory and operational requirements, policy context, consultation
Land-use planning: 1 Master Plan	Unclear
Water: 1 Water Plan	Feasibility, infrastructure, costs, impacts, legislation, time
Waste management: 1 Regional Waste Management Plan	Waste hierarchy, costs, technology, environmental impacts

Table 4.3. Strategic Environmental Assessment (SEA)-specific alternatives identification criteria.

Criterion	Definition
Environmental/SEA objectives	Environmental protection objectives that are relevant to the plan or programme (and alternatives) and the way those objectives have been taken into account (Annex 1, SEA Directive)
Existing environmental issues	Linked to the setting of environmental objectives is the identification of existing environmental issues in the baseline. In the evidence-based approach, alternatives must be able to respond to specific issues in the environment. The test of the alternative in this situation lies in its ability to solve existing problems
Potential environmental issues	Not only should alternatives be able to solve existing problems but they should also aim to avoid or mitigate potential issues. The notion of potential issues is closely linked with the evidence from the baseline and the setting of appropriate environmental objectives, each of which has a role to play in the development of alternatives
Hierarchy of options	Different types of alternatives exist at different tiers of decision making (Therivel and Partidario, 1996; Therivel, 2004; Fischer, 2007)
Tier of decision making	In theory, a tiered hierarchy for environmental decision making exists which differentiates between policies, plans, programmes and projects (Wood and Djeddour, 1992). While the notion of tiering within policy decision making is not without its challenges (Noble, 2000; Scarse and Sheate, 2002; Arts <i>et al.</i> , 2005), as a criterion it provides a very useful structure for the development of alternatives specific to differing decision-making levels
Path dependency	Path dependency within a tiered decision-making hierarchy refers to the way in which policy decisions create a context for subsequent decisions, and thereby create a certain path dependency, reinforcing the likelihood of similar decisions in the future
Timing	To be fully effective the SEA must be timed to run in parallel with the plan-making process, which will allow for interventions to be made in an effective manner
Consultation	The requirements for consultation under the SEA Directive set out who should be consulted and when. At a minimum, consultees should be given an 'early and effective' opportunity within appropriate time frames to participate in the SEA process and express their opinions. The consultation opinions within SEA are required to be " <i>taken into account during the preparation of the plan or programme and before its adoption or submission</i> " (Article 6), whereas in the environmental impact assessment process opinions are only to be taken into account in the development consent procedure (Sheate <i>et al.</i> , 2005)
Sustainability	To progress the goal of sustainability, such decision criteria should be included in the development of alternatives (Gibson <i>et al.</i> , 2005). By including such criteria, all policy and development objectives are considered together and trade-offs are addressed directly such that best options and not just acceptable options are achieved (Gibson, 2006)

Table 4.4. Existing and proposed Strategic Environmental Assessment (SEA) alternatives development criteria.

Existing SEA alternatives development criteria	Proposed additional SEA alternatives development criteria
Geographic scope of plan or programme	Tier of decision making
Plan or programme objectives	Path dependency
Acceptable	Hierarchy of options
Legal (meet statutory requirements)	SEA/environmental objectives
Realistic/relevant/reasonable	Existing environmental issues
Technically feasible	Potential environmental issues
Economically feasible	Consultation
Sustainability criteria	Timing

each potential respondent by e-mail. The two-page questionnaire was followed up with a phone call to each respondent to ensure that it was received by the right person and to outline the purpose of the exercise. This was then followed up on a weekly basis by either an e-mail or telephone call over a 4-week period to individuals who had not returned the completed questionnaire.

The questionnaire survey took the form of three main sets of questions (which were further subdivided into a list of sub-questions as follows:

1. The role of SEA in the development of alternatives
2. Comments on the potential list of criteria
3. Suggest a hierarchy of criteria ([Appendix 4](#)).

4.3.2 Results

The questionnaire was sent to a total of 15 (of which 12 responded) local authorities (four local authorities were in the process of working on SEAs and two staff were contacted in each, bringing the total to 16 local authority staff contacted), four environmental consultancies (all of which responded), and three statutory consultees (all responded). In addition, the questionnaire was also forwarded to impact assessment and planning academics in Ireland (four) and in the UK (three), all of which responded ([Table 4.5](#)).

Q1: *Environmental planning, SEA and the development of alternatives*

- Q1.1: Based on the survey results it was clear that overall there was a relatively high (50–80%) appreciation of the potential role of SEA in the development of alternatives generally. However,

there was also a relatively high level of uncertainty as to the role of SEA in the development of alternatives amongst the regulatory authority staff and the consultants (50%), while the statutory consultees and the academics believed that SEA has a much stronger role to play in their development (70–80%).

- Q1.2: In relation to the specific role of SEA in the development of alternatives, all respondents agreed that the use of SEA should be mainly concerned with addressing existing and potential environmental problems.
- Q1.3: When asked whether existing criteria were sufficient to meet the needs of SEA both the academics and statutory consultees disagreed with this statement (40% and 50%, respectively). Regulatory authority staff and consultants were more in agreement (70%) that sufficient criteria already existed.
- Q1.4: When asked if the SEA process required the development of new criteria, 60% of the academics and 50% of the statutory consultees agreed with this, while only 30% of the responsible authorities and consultants agreed with the statement ([Fig. 4.1](#)).

Based on the results of this set of questions, it was clear to the author that SEA has a definite role to play in the development of alternatives, particularly in relation to dealing with environmental aspects. However, it was also clear that respondents felt that existing criteria were sufficient in this regard and that it was not necessary to develop new criteria. These findings were later confirmed in the one-to-one interviews.

Table 4.5. Gross return rate of questionnaire.

Type of respondent	Number surveyed	Returned	Response rate
Responsible authority	15 (19 staff)	12 (16 staff)	75%
Consultants	4	4	100%
Statutory consultees	3	3	100%
Academic consultees	7	7	100%

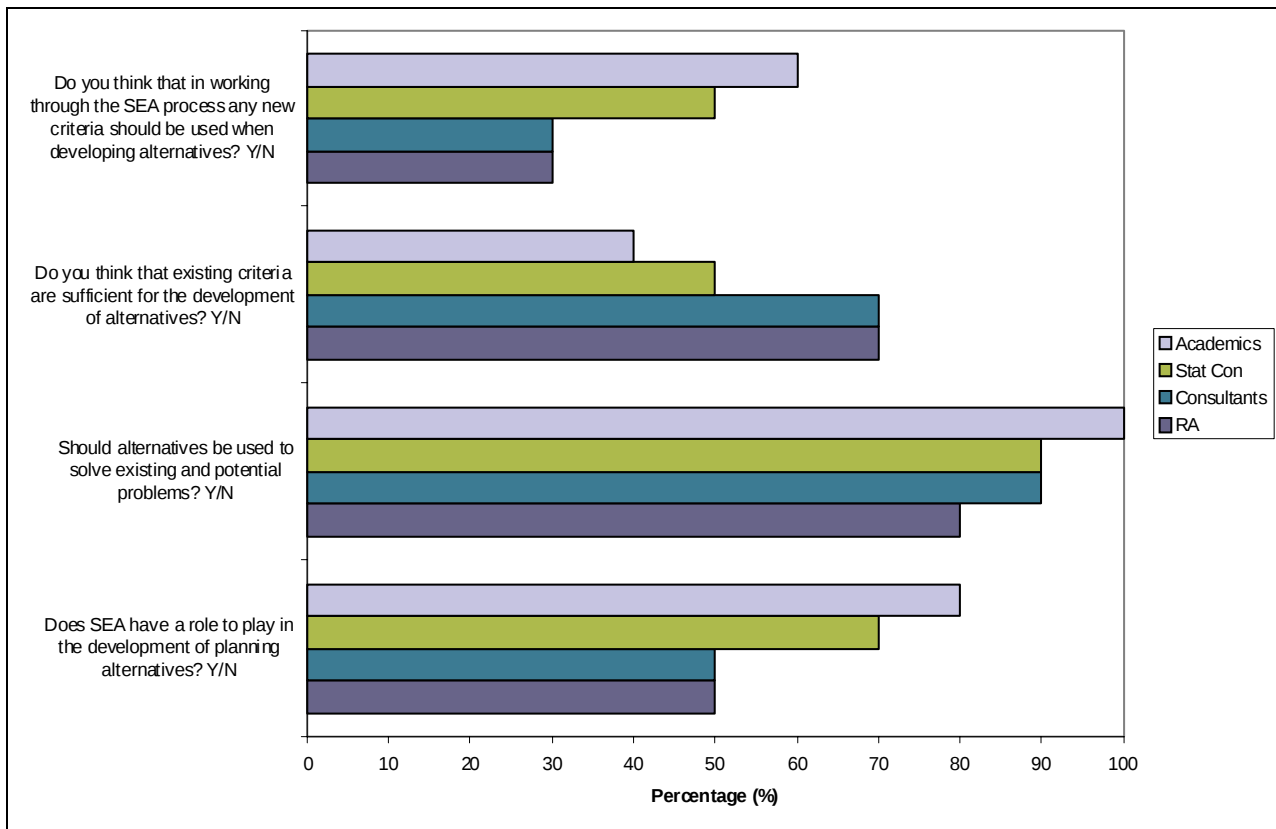


Figure 4.1. Views on environmental planning, Strategic Environmental Assessment and the development of alternatives. Academics, academic consultees; Stat Con, statutory consultees; RA, responsible authority.

Q2: Potential alternatives development criteria

The respondents were asked to state their preferences for the potential SEA criteria (Fig. 4.2). A number of points are of note in the responses received. Overall there was a very positive response to the validity of all the criteria suggested. However, it is noteworthy that the two criteria of (i) the ability to solve existing environmental issues, and (ii) the ability to solve potential environmental issues were seen as most pertinent by all respondents, while the three related criteria of (i) hierarchy of options, (ii) tier of decision making, and (iii) path dependency received the least favoured responses especially from the consultants.

For the regulatory authorities the criteria that received the most favoured responses were sustainability criteria, ability to meet existing problems and to a lesser extent the policy formation type criteria. For the consultants, the criteria of most value were seen to be those that could solve existing and potential environmental problems. The statutory consultees

were most concerned with addressing existing and potential problems, SEA objectives, consultation and timing; there was less interest in the policy formation type criteria. The criteria of most interest to the academics included sustainability criteria, environmental objectives and issues (existing and potential), consultation and timing. As with the statutory consultees, there was a little less interest in the policy formation criteria.

Based on the results of this set of questions, it was clear to the author that the alternatives development criteria suggested were regarded positively by most of the respondents. While it was clear that difference of opinion existed according to the respondents' role in the SEA process, it was also clear that the set of criteria being suggested had legitimacy.

Q3: Potential decision tree

- Q3.1: Do you think the criteria could form the basis of a decision-making tree to be used in the

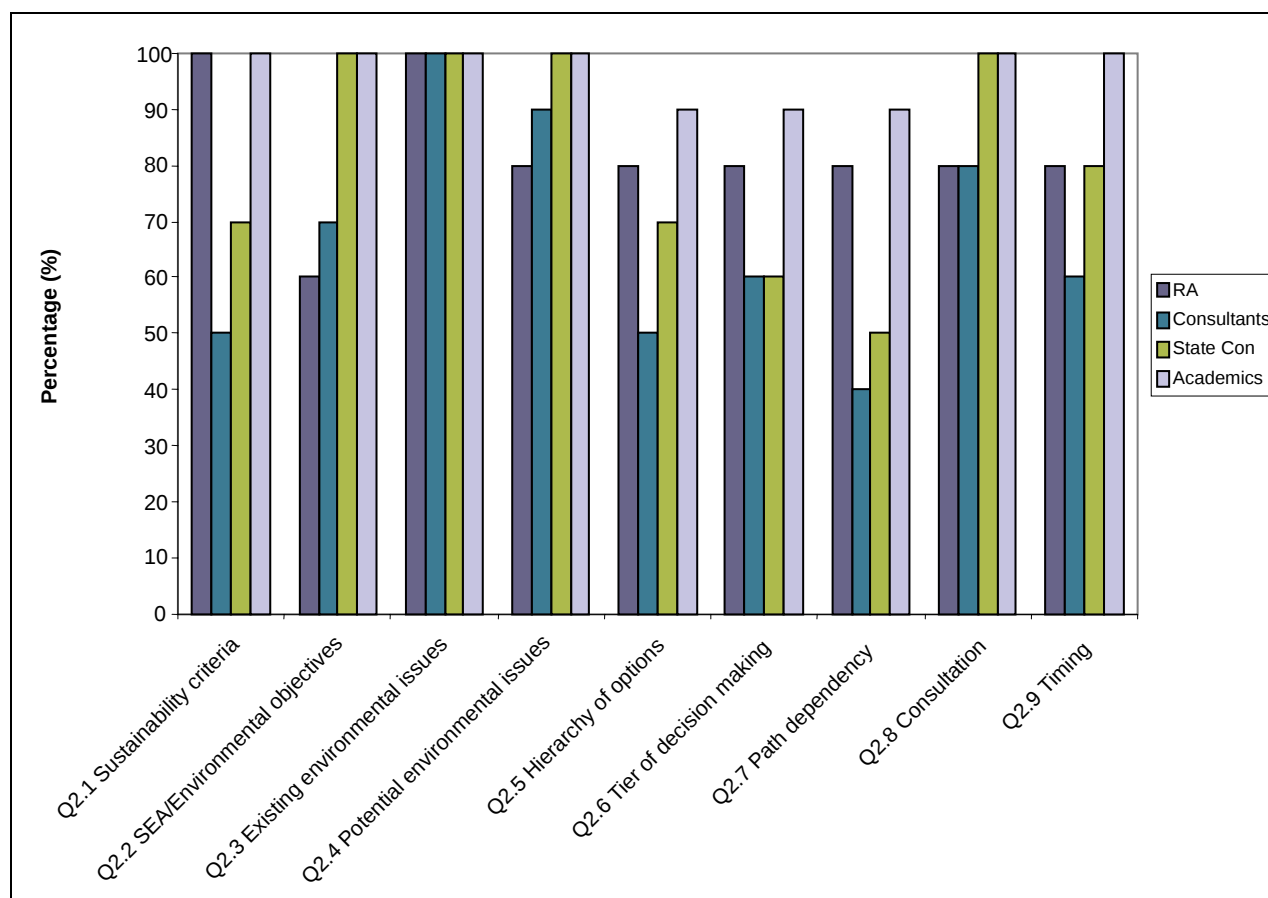


Figure 4.2. Views on potential list of criteria. Academics, academic consultees; Stat Con, statutory consultees; RA, responsible authority; SEA, Strategic Environmental Assessment.

development of alternatives? The academic and statutory consultees agreed (80% and 60%, respectively) that the criteria suggested in Q2 would be useful to form the basis of the proposed decision tree, while 50–60% of the consultants and responsible authorities agreed.

- Q3.2: Would such a decision-making tree be useful for the development of alternatives? In relation to the development of a decision-support tree there was a very positive response to the development of such a decision tool ranging from 70% (responsible authority and statutory consultees) to 80% consultants and 90% academics.

Based on the results of this set of questions, it was clear to the author that the development of a decision-making tree based around the criteria set out in Q2

would be viewed positively by all those involved in the SEA process (Fig. 4.3).

4.3.3 Overall results of survey

Based on the survey, the main findings can be summarised as follows:

- Strategic Environmental Assessment has a definite role to play in the development of alternatives for environmental and planning processes (over and above its role in the assessment of alternatives)
- The set of alternatives development criteria suggested has legitimacy. However, no new criteria were suggested
- The set of criteria suggested could be usefully used as the basis for the development of a decision-making tool.

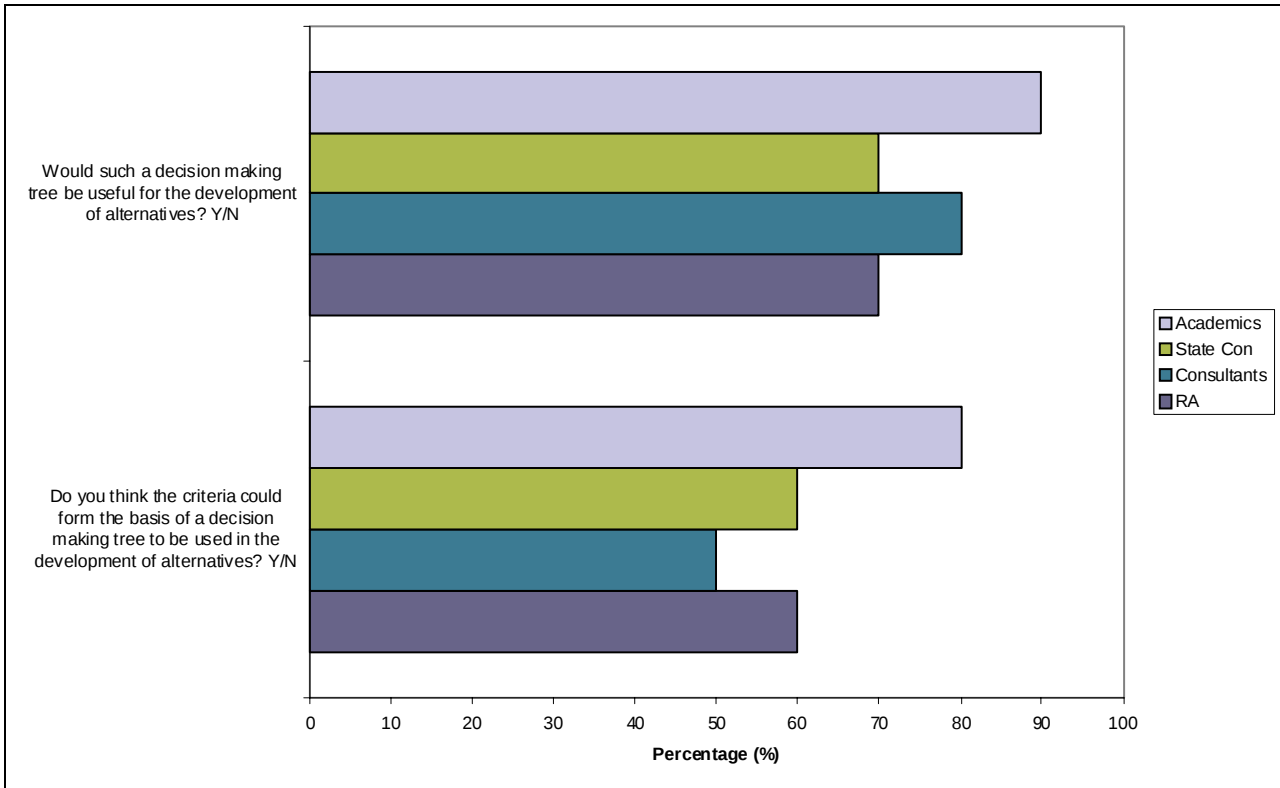


Figure 4.3. Views on potential decision-making tree. Academics, academic consultees; Stat Con, statutory consultees; RA, responsible authority.

4.4 Face-to-Face Interviews with a Sample Set of Strategic Environmental Assessment Practitioners in Ireland

As a follow-up to the questionnaire responses, it was further decided to bring the questionnaire to a sample from the four sets of SEA stakeholders with different perspectives, understandings and roles within the SEA process with a view to further refinement. The stakeholders included:

- One official SEA consultee with responsibility for providing advice and assistance on SEA and progressing national guidelines
- Two sets of plan makers at the local authority level with responsibility for environmental decision making
- Two environmental consultants with responsibility for undertaking SEAs, interpreting guidelines and methodologies, and

- Four academic planners working in the area of SEA.

The sample group members was decided upon due to their ongoing involvement and high levels of understanding of the SEA process. Semi-structured interviews were conducted based on the original three sets of questions outlined in the survey ([Appendix 4](#)) and were used to further interrogate the survey findings.

4.4.1 Outcome of interviews

Q1: The role of SEA in the development of alternatives

The outcome of the interview process was to reveal that for some practitioners SEA was seen to have a potentially positive role to play in the development of environmental planning alternatives, while some others were as yet unsure of its benefits. From the author's perspective, it was noted that those who were most engaged with the process on an ongoing basis were the more enthusiastic supporters, while those who had limited engagement were most sceptical of its

merits. For example, one of the statutory consultees argued:

“The new element that SEA brings to the plan-making process is to introduce ideas of ‘compare, contrast and justify’. In introducing this element transparency is brought to the development of alternatives and brings them to the centre of decision making”.

In a similar vein, one responsible authority interviewee viewed the role of SEA positively for the development of alternatives, particularly at mid-level plans such as County Development Plans within the spatial planning process:

“In particular the SEA system introduces a systematic process for the identification and collection of environmental data, which is necessary to have to hand before any decisions are taken. In this way, SEA brings a new focus that has not been present heretofore. While environmental elements have always informed decision making, they tended to be scattered throughout plans, now they are contained in one report. This is a real improvement”.

For one of the planning consultants interviewed the role of SEA in the development of alternatives was unequivocal:

“The introduction of SEA causes planners and elected representatives to begin to consider proper alternatives, which represents a profound change. It means that environmental impacts can now be anticipated and avoided. For elected representatives and developers there is now an evidence-based response required”.

However, the role of SEA was also seen by other practitioners to be problematic. The main problems as perceived by the respondents were procedural, institutional and judicial in nature.

Procedurally, there was a perceived lack of guidelines in relation to the identification of alternatives at different sectors and levels of decision making. In this respect, there was a general desire that simple guidelines should be produced that would allow them to develop alternatives that would be in compliance with SEA legislation. The lack of experience of SEA in Ireland, which resulted in few national case studies to

which practitioners could refer to for guidance was also seen as problematic. For example, as one of the consultants argued:

“Since there is so little official guidance or work done in this area yet in Ireland, we are all finding our feet. It will be a while yet before good case study material emerges. As the process seems to be evolving differently in the UK and Scotland, we cannot rely on their findings”.

Institutionally, there was a recognised lack of experience within authorities in the development of alternatives. In some circumstances, the overall benefit of SEA to the planning process is not universally perceived or understood. For some respondents it was felt that the development of alternatives was already being undertaken as part of best practice in planning and that the Directive was now simply adding an assessment element to this practice. However, as one practitioner pointed out, by making consultation (both internal and external) central to the process, there was now the possibility of getting agreement on strategic issues and objectives within a plan area onto the table early in the process and particularly in advance of decisions being taken. For example:

“Proper consultation at the level of the local authority itself (between different authority sections) is very important as it avoids conflict. Also, it is important that it is done early and before official scoping meetings as it gives everybody a chance to input from their perspective and suggest possible alternatives and mitigation measures”.

In addition, it was noteworthy that those with least experience of the process felt that it was the role of external consultants hired to undertake the SEA to develop the plan alternatives. For example, one academic planner argued:

“The role of the consultants is to add something new or develop alternatives to those set out by the plan team”.

Legally, there were severe constraints being imposed on the development and identification of alternatives due to time and resource limitations. In Ireland the timing of the SEA within the policy/plan review process

is bound by legislative requirements as set out in the Planning and Development Acts, 2000–2006, which set very strict time limits for different elements of the planning process. This means that the SEA has to be conducted within existing tight time lines, which can impact on the effective development of alternatives. Additionally, the absence of SEAs at the higher and more strategic levels of land-use planning was perceived as problematic. As one academic respondent argued:

“It could be 20 years before all tiers of planning have been fully subjected to SEA. As it stands, we’re beginning at the bottom and working towards the middle, with little reference to alternatives at the top levels”.

Q2: Comments on the potential list of criteria

Overall the respondents agreed with the direction of the criteria and no new criteria were suggested for consideration. In this regard it was felt that there were ample criteria dispersed amongst any number of guidelines, which should be brought together and

presented in one cohesive set. One of the planning consultants argued that:

“There are generally no new criteria introduced by the SEA process. However, what it does is to reiterate, emphasise and front-load existing criteria. In Ireland the criteria generally used are implicit but need to be spelt out for reasons of transparency in decision making”.

Some general comments received in relation to each criterion are set out in [Table 4.6](#).

Q3: Potential decision tree

Based on the description of the potential decision tree suggested by the author (see below), all respondents showed remarkable enthusiasm for such a decision-making tool. Overall, it was felt that guidance was needed in the steps to be taken in the development of alternatives that would not only continue to meet planning criteria but would also be able to meet the demands being imposed by meeting environmental considerations. It was felt that a simple step-by-step decision tree based on the earlier discussed criteria would be most useful. As one consultant argued:

Table 4.6. Comments on alternatives development criteria (SEA, Strategic Environmental Assessment).

SEA criterion	Comments
Sustainability criteria	Essential. However, no generic list of sustainability criteria is available. Sustainability criteria are dependent on the planning sector and the level of the plan within the decision-making hierarchy. Sustainability criteria must be linked to the mandatory objectives of the plan under consideration
SEA/Environmental objectives	This is very important if the goals of environmental protection are to be included in the plan-making process
Existing environmental issues	The alternative must address existing environmental problems. If the proposed policy/plan is not being formulated to address existing problems it is effectively useless
Potential environmental issues	As environmental plans can have long lifespans (10–20 years) it is important to be able to anticipate and be able to address future potential problems through SEA
Hierarchy of options	An important consideration, which is dependent on the tier of decision making. In setting out what options are available early in the process, it allows the planner to signal limitations that may exist in relation to certain plans
Tier of decision making	This is important and clearly related to the hierarchy of options. Both must be considered together as they are dependent on each other
Path dependency	Important consideration in justifying why certain alternatives are available or not in the plan
Consultation	Important. However, most felt that in reality the ability to consult widely was restricted due to the legal requirements of the planning process
Timing	Important. The timing of the development/identification of alternatives should begin as soon as possible to allow for consultation, redevelopment, and refinement

“Something straightforward and easy to use would be useful. It would also add transparency to how the alternatives are developed”.

It was also felt that such a tool should be easily and readily understood and available in a simple A4-page format. Following from these and further discussions, the decision-support framework was devised and worked on through various revisions.

4.5 Decision-Support Framework

Based on the alternatives identification criteria the decision-support framework was further developed. The methodology used here was based on further use of the interviewee questionnaires and follow-up interviews. In addition, the author conducted in-depth interrogation of the framework with recognised experts in the field (four academics and statutory consultees were spoken to in face-to-face interviews and through e-mail and telephone conversations). After a number of reiterations, discussions and presentations, the following framework has emerged (Fig. 4.4). For example, versions of the framework were delivered at University College Cork in-house seminars and a version was also presented at the International Association of Impact Assessment (IAIA) Conference in Korea in May 2007. The framework received an amount of feedback and comment and was generally seen as being a positive contribution to the development of SEA internationally. As a result of this conference, the author was invited to submit this element of the research as a method paper to the journal of *Impact Assessment and Project Appraisal* (which is now forthcoming).

The decision-support framework is based on a series of questions (giving rise to Yes/No answers), based on the alternatives development criteria, which is designed to assist practitioners in the development of reasonable alternatives for the plan-making process. The framework is further divided into activities that are best undertaken during the scoping exercise and those that are conducted during the environmental report preparation.

In addition, the decision-support framework places emphasis on consultation and the iterative nature of alternatives identification and development. Advice

notes will assist practitioners where wording/meaning might be unfamiliar.

4.5.1 Development of alternatives within scoping exercise

The first question is to determine the existing broad alternatives that are specific to the sector under consideration such as land-use planning, waste, water and so on. This initial exercise will allow practitioners to consider what alternatives currently exist and those that are being developed. At this early stage, practitioners can begin to consider the sustainability criteria of relevance to their sector. For example, in land-use planning, sustainability criteria may include housing and development densities, integrated land-use and transport planning.

The second question is to determine the context of the plan/programme within the tier of decision-making hierarchy. This will allow the practitioner to determine if a dependency path has been set for the plan based on higher-level obligations. If a dependency path has been set for the plan in question, this needs to be identified and the options that are now available should be set out based on the alternatives hierarchy. If a dependency path has not been set (if the plan/programme is at the top of the decision-making hierarchy), broad-level strategic alternatives will still be open for consideration. If the dependency path has not been identified, work needs to be undertaken to identify same and then refer to the alternatives hierarchy to determine what is available. At the end of the scoping exercise, broad-level alternatives appropriate to the sector/tier of decision making should have been identified.

4.5.2 Development of alternatives within environmental report preparation

Having decided on the broad types of alternatives available, they must now be worked up to include two sets of criteria:

1. The plan or programme's vision objectives and issues, and
2. The environmental issues (existing and potential) and objectives.

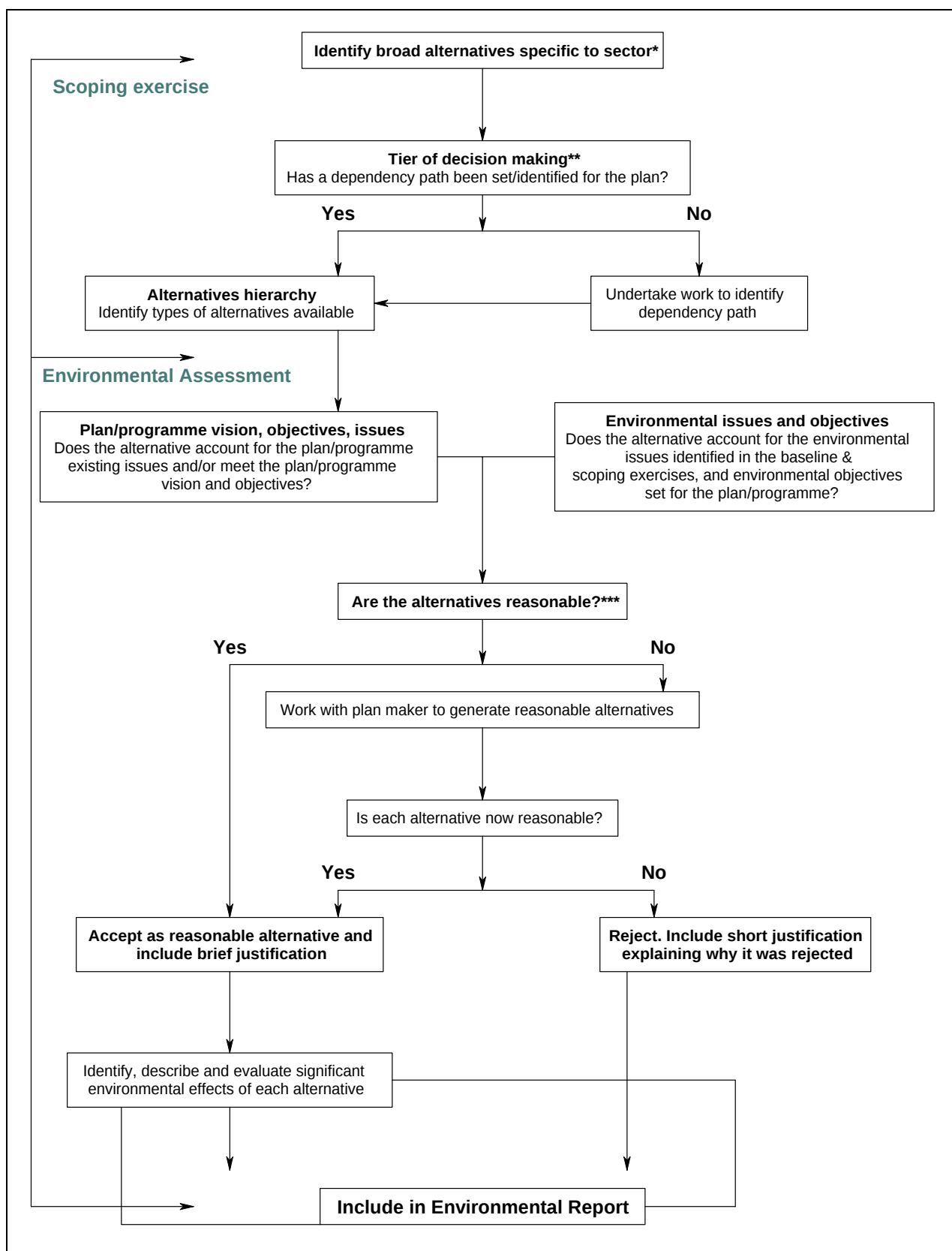


Figure 4.4. Decision-support framework for identifying Strategic Environmental Assessment alternatives.
 *Include sustainability criteria specific to sector. **Explain plan context in decision-making hierarchy.
 ***Explain reasonable alternative.

The third question tries to determine if the alternatives are 'reasonable' or not. At this point an advice note on the term 'reasonable' will need to define what it means in a particular planning context. For example, as outlined earlier ([Section 1.1](#)), a useful definition might be alternatives that are context specific, issues driven and participatory where multi-objectives are central and trade-offs made explicit.

If the alternatives are deemed reasonable they can be accepted for inclusion in the environmental report. However, at this point there might exist alternatives, which at the outset might not be seen as fully

reasonable but, with additional work between the plan maker and the SEA team, they might become reasonable. If, once worked up, the alternative becomes acceptable, it can now be included in the environmental report. If, however, the alternative includes none of the plan/SEA criteria and cannot be realistically seen as reasonable it should be rejected and a brief note justifying the decision should be included in the environmental report. Finally, the accepted reasonable alternatives should be subjected to assessment and included in the environmental report.

5 Strategic Environmental Assessment Alternatives in Waste Management Planning

The generic alternatives decision criteria and support framework were further applied to waste management planning. Initially, a review of the prevailing policy, planning and implementation framework was set out. An assessment was then carried out on how waste management planning alternatives are currently identified in Ireland, and they were further assessed against the goals and procedures of the SEA process. Finally, the generic criteria were assessed against waste management planning requirements to determine to what extent the existing alternatives are sufficient to meet both the requirements of waste planning and SEA legislation in Ireland.

5.1 Context of Waste Management Planning in Ireland

The generation of waste in Ireland is considered to be high by international standards (Eurostat, 2005; OECD, 2005). While this reflects better data collection and reporting (EPA, 2000; Eunomia, 2007), actual increases have occurred in line with the emergence of the so-called 'Celtic Tiger' economy (Taylor, 2001; Clinch *et al.*, 2002). However, an adequate waste infrastructure has not developed in tandem (Forfas, 2003; EPA, 2004; EEA, 2005; Eunomia, 2007). The pressures generated by increased waste and lack of infrastructure have had a number of undesirable impacts such as the export of waste, illegal dumping, fly-tipping and backyard burning. For example, significant quantities of recyclable waste materials are exported for recovery and recycling as an indigenous recycling industry is almost non-existent (EPA, 2006). Such pressures have placed an enormous burden on local authorities to effectively manage municipal solid waste (Desmond, 2006).

Increasingly, the governance of waste in Ireland is spread across a number of private operators and local authorities. Recently, there have been rapid changes due to the continued development and consolidation of the private sector, the changing role of local authorities as service providers and competitors within the

industry, and the movement towards full cost recovery for waste services (DoEHLG, 2006a). In this context there would seem to be "*limited control over waste by any organisation*" (Eunomia, 2007, p. 46). This has major implications for the provision of large-scale infrastructure such as incinerators which must be guaranteed a constant supply of waste to be economically viable. Thus, the nature of waste governance has an important role to play in the development of alternatives and options.

Until the mid-1990s, waste legislation in Ireland was based on the Public Health (Ireland) Act, 1878 (Fahy, 2003). Today, the Environmental Protection Agency Act, 1992, the Waste Management Acts, 1996–2001, the Protection of the Environment Act, 2003, and economic instruments, including the landfill and plastic bags levies coupled with the policy documents *Changing Our Ways* (DoELG, 1998), *Preventing and Recycling Waste: Delivering Change* (DoELG, 2002c), *Taking Stock and Moving Forward* (DoEHLG, 2004b) and the *National Strategy on Biodegradable Waste* (DoEHLG, 2006b), represent a comprehensive framework for modernising waste management in Ireland.

National waste policy is firmly focused on the development of an integrated waste management approach underpinned by the European Union 'waste hierarchy' (European Commission, 1975). The waste hierarchy of policy alternatives places greatest emphasis on waste prevention, minimisation, reuse, recycling, energy recovery and the environmentally sustainable disposal of residual waste (DoELG, 1998, 2002c). The integrated approach to waste management suggests a mix of policy alternatives. More recently the EU's *Sixth Environmental Action Programme* (COM 31 final, 2001) addresses the need to decouple economic activity and environmental degradation. In addition, the Programme also advocates enhanced public participation in waste management planning (Morrissey and Phillips, 2007).

One of the main objectives of national policy is to drive waste up the hierarchy and away from landfill in favour of a range of treatment options. Key national targets are contained in the policy documents *Changing Our Ways* (DoELG, 1998) and the *National Biodiversity Strategy* (DoELG, 2002d). The implementation of national policy has been based on the formulation of waste management strategies and plans at regional and local levels, which are subject to review on a 5-yearly basis. However, many authorities have experienced difficulties in the roll-out of their plans for a number of economic reasons and because “*waste treatment options are often controversial and proposals for significant scale waste infrastructure have generated strong opposition*” (DoEHLG, 2004b). In spite of this insight, the follow-up review plans are being developed in exactly the same way as before (Morrissey and Phillips, 2007), with little apparent analysis of what happened in the intervening period (Eunomia, 2007).

Central to the preparation of RWMPs has been the development and assessment of ‘waste scenarios’ to determine the Best Practicable Environmental Option (BPEO) and economic options. The waste scenarios are based on a mix of alternatives and represent a

combination of different waste management technology options (Table 5.1).

Based on a sample of three sets of RWMPs the described waste scenarios are outlined. The three sets were chosen because they represent a geographic spread of both urban and rural areas and have been undertaken by different consultancies (most of the regional plans were undertaken by one or other of these companies).

In light of the current situation it seems necessary to tease out the criteria used to guide waste management decision making in Ireland with a view to understanding the scenarios/alternatives developed and determining if they are adequate to meet the demands of SEA.

5.2 Identification and Characterisation of Waste Management Alternatives

The determination of national waste management alternatives across the European Union is broadly based on the existing waste management facilities, infrastructure and governance structures (EEA, 2007). In Ireland the development of waste management alternatives are further driven by:

Table 5.1. Overview of Regional Waste Management Plan waste scenarios.

Region	Policy alternatives	Scenarios developed	Preferred alternative	Options
Midlands Waste Management Strategy	Recycling, thermal treatment, landfill	3	Maximum diversion of waste from landfill through implementation of maximum (feasible) recycling and introduction of thermal treatment	3-bin collection service, MRF, thermal treatment with energy recovery, landfill with energy recovery
Cork Regional Strategy	Recycling, thermal treatment, landfill	3	Maximum recycling, large-scale home composting, thermal treatment and landfill	Home composting, bring sites and civic amenity sites, waste recovery facility (mechanical separation and baling), composting or digestion, landfill and incineration with energy recovery
South-East Regional Strategy	Recycling, thermal treatment, landfill	4	Full recycling with residual to waste recovery/stabilisation facility (MBT) and residual to landfill	3-bin collection, MRF and biological treatment, use of MBT with residue being combusted in thermal treatment facility, landfill

MBT, Mechanical Biological Treatment; MRF, Materials Recovery Facility.

- National policy
- Waste risings (quantities and character)
- Requirement to meet national waste targets
- Waste management methods.

Under Irish waste management legislation (Government of Ireland, 1997), the identification of waste alternatives must adhere to the principles of self-sufficiency, best available techniques, proximity, precaution, producer responsibility, and polluter pays. Decision criteria for the identification of alternatives include the technical strengths and weaknesses of the technology or systems chosen, capital and operating costs, resource recovery potential (material or energy), interface with current practices, current and future regulatory context, land-use and siting considerations, energy consumption, transport infrastructure, groundwater usage and vulnerability (FÁS, 2003).

While the decision criteria have been devised to meet the objectives of waste management planning, it is not altogether clear if they meet the requirements of SEA at different tiers of decision making. The imposition of SEA into waste management planning brings with it new considerations. Such considerations are driven by the achievement of the main objectives of SEA and include environmental protection and the integration of the environment into the higher levels of the decision-making process. Thus, the convergences and divergences between the two systems must be established.

5.3 Waste Management Planning and Strategic Environmental Assessment

From the outset it would seem that the waste management planning process and SEA have a lot in common. Both by their nature are concerned with environmental protection and the achievement of sustainability. As Scannell (2006) argues, waste management planning in Ireland is already subject to a form of SEA. In theory, both processes follow a similar stepwise procedure of context description, baseline description, alternatives development and assessment and follow-up measures. However, there are procedural and substantive differences which need to be considered if SEA is to be effectively applied to

waste management planning in Ireland with a view to achieving sustainable development ([Table 5.2](#)).

There are many similarities between the waste management planning and SEA approaches such as the description of the geographic area and plan objectives; however, there are also a number of differences that need to be explored. The main differences between the two sets of processes can be seen in relation to the setting of broad environmental protection objectives, consultation, detailed description of the current and future state of the environment as a result of implementing the plan or programme, likely significant environmental issues and monitoring. These elements need to be brought forward in the development of waste management plans if they are to meet the SEA goals.

5.4 Alternatives Development for Strategic Environmental Assessment: Decision-Making Criteria

When the generic set of decision criteria ([Table 4.4](#)) is integrated with the existing waste management planning alternatives development criteria, the full list might resemble those set out in [Table 5.3](#).

Some criteria are quite specific to waste management planning such as the waste hierarchy, waste streams and volumes; others are generic such as plan issues, legal, technical and economic feasibility (Desmond, 2007b).

Some overlap seems to exist in relation to the consideration of the geographic scope of the plan/programme (referred to as the functional area of the plan in waste management planning) and inclusion of the plan objectives; however, with the inclusion of SEA these criteria are modified. For example, the geographic scope of the plan is expanded as a result of the SEA process due to the requirement for transboundary consultation. The process recognises that most environmental processes do not respect neat political and administrative boundaries and can impinge on other jurisdictions. As a result, other Member States likely to be impacted upon by a proposed plan or programme must now be consulted in transboundary situations such as waste management. For example, in the context of the

Table 5.2. Relationship between waste management planning and Strategic Environmental Assessment (SEA): the differences between approaches.

Waste management planning	SEA	Differences
Establish waste management policy context and objectives of the plan	Set the context and identify broad environmental protection objectives for the SEA Identify links to other strategic actions Public and transboundary consultation	Identification of broad environmental protection objectives of relevance to the plan/programme Early and effective consultation within appropriate time frames
Waste baseline description including general description of area, relevant land-use considerations, groundwater usage and vulnerability, size and distribution of population, economic activity, transport infrastructure Quantify waste risings (including characterisation) and determine future disposal requirements	Determination of baseline environment: establish current state of the environment and the likely evolution without implementation of the plan, determine the environmental characteristics of areas likely to be significantly affected, detail any existing environmental problems of relevance to the plan Detail likely significant effects on topics set out in Annex 1 of the SEA Directive Detail measures to mitigate any significant adverse effects	Determination of current state of environment and its evolution without implementation of the plan, likely significant effects on the environment including topics set out in Annex 1 of the SEA Directive
Assess waste management options and identify facilities required	Identify reasonable alternatives Predict and evaluate impacts of alternatives	Identification and evaluation of more sustainable alternatives
Prepare plan and develop implementation of programme	Mitigate impacts of chosen alternatives Monitor impacts of chosen action	Impact mitigation, monitoring and follow-up

Table 5.3. Waste management planning and Strategic Environmental Assessment (SEA) alternatives development criteria.

Existing waste alternatives development criteria	SEA alternatives development criteria
Geographic scope of plan/programme	Tier of decision making
Objectives of plan/programme (including international/EU waste objectives)	Path dependency
Waste hierarchy	Hierarchy of options
Plan issues (e.g. existing infrastructure, implementation of policies/objectives)	SEA/Environmental objectives
Waste streams and volumes (current and predicted)	Existing environmental issues
Legal feasibility (statutory requirements current and anticipated)	Potential environmental issues
Technically feasible approaches (current and anticipated technologies)	Sustainability
Economic feasibility (capital and operating costs)	Consultation
National waste policy objectives and targets	Timing

National Hazardous Waste Management Plan, countries receiving hazardous waste from Ireland were notified and submissions requested from England, Scotland, Wales, Denmark, Belgium, Holland and Norway (EPA, 2007).

The addition of SEA-specific criteria to the development of alternatives brings new demands; however, it is the contention of the author that their inclusion should assist practitioners to meet the goals of SEA. Each of the additional SEA criteria ([Table 4.6](#))

is considered in relation to waste management planning in Ireland in the remainder of this section.

5.4.1 Tier of decision making

In theory, a tiered hierarchy for environmental decision making exists which differentiates between policies, plans, programmes and projects (Wood and Djeddour, 1992). While the reality may be different (Therivel, 2004), practitioners are likely to be able to identify alternatives specific to the administrative level and systematic tier that SEA is applied to (Fischer, 2007). While the notion of tiering within policy decision making is not without its challenges (Noble, 2000; Scarse and Sheate, 2002; Arts *et al.*, 2005), as a criterion it provides a very useful structure for the development of alternatives specific to differing decision-making levels.

In waste management planning in Ireland a clear hierarchy of planning exists through which policy can flow from the uppermost levels of national policy, to RWMPs, local plans, and waste management projects (Fig. 5.1). However, within each of these layers of decision making a blurring between policies and plans exists. For example, RWMPs will contain policies, plans and programmes for strategic actions such as waste disposal, while local plans will also contain

policies and plans specific to their immediate area. In spite of the apparent confusion, the notion of tiering is important to consider when setting alternatives for individual policies, plans or programmes in that it allows practitioners to place their strategic action within a recognised hierarchy and identify the policies/objectives and targets which must be carried through into their own plan making from higher levels and which will subsequently be carried down to lower levels. For example, it is possible to identify the cascade of national waste policy from higher-level policy down to regional-level plans.

5.4.2 Path dependency

Path dependency within a tiered decision-making hierarchy refers to the way in which policy decisions create a context for subsequent decisions, and thereby create a certain path dependency, reinforcing the likelihood of similar decisions in the future (Scarse and Sheate, 2002).

In waste management planning in Ireland a path dependency based on the waste hierarchy exists, which sets out a clear policy direction and an attendant broad suite of alternatives (prevention, reuse, recycling, energy recovery and final disposal). However, it is worth noting that in a recent study

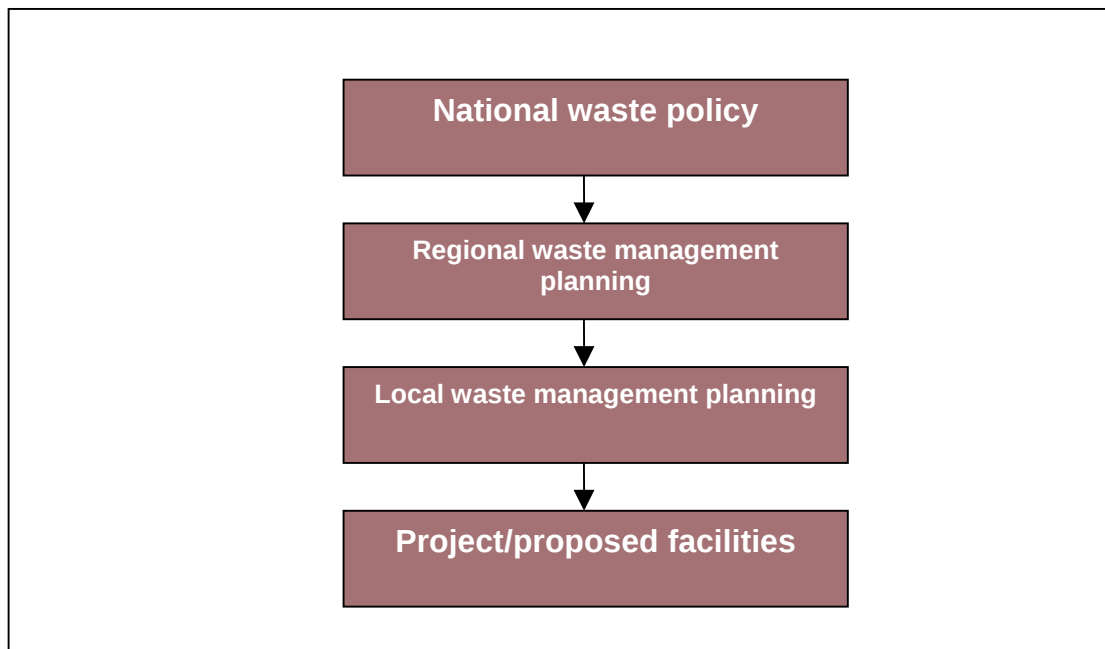


Figure 5.1. Ireland's waste management planning hierarchy.

(Eunomia, 2007) it was argued that a policy path has been set for incineration in such a way as to exclude all other reasonable waste disposal options. In the context of a technology that is time consuming to implement and has traditionally shown the greatest potential to generate public discontent, the notion of path dependency comes into stark relief while demonstrating the need for SEA at higher levels of decision making.

Based on the notion of tiering and path dependency, broad alternatives should be assessed at the level of national strategies, while their attendant options should be developed and assessed at the lower level of regional waste management planning. Thus, it can be argued that different layers of decision making give rise to different types of alternatives which must be accounted for within SEA.

5.4.3 Hierarchy of options

Different types of alternatives exist at different tiers of decision making (Therivel, 2004).

Within waste management at the level of policy the alternatives available focus on achieving the objectives

and targets set out under the EU waste policy and the Landfill Directive (1999/31/EC) in particular. At this level the focus is on setting directions or visions for lower-level plans, programmes and projects through the broad brush stroke of the waste hierarchy. At the level of regional plan making, the orientation is towards the implementation of national policy. At this level the alternatives available can be understood as options or sub-alternatives of those generated from the higher tiers of decision making and focus on getting things done through various methods and technologies. At local level, the focus is generally on spatial alternatives (Fischer, 2002), i.e. deciding where infrastructure will be located, networks and densities. At the lowest level of programmes, the concern is with both location and timing, for example the location of bring banks and the timings of waste collections (Table 5.4).

5.4.4 Environmental policy context review: setting environmental objectives

The SEA Directive requires information on the relationship of the plan or programme with “*other relevant plans and programmes*”, the environmental protection objectives, established at international,

Table 5.4. Potential waste management alternatives available at different tiers of decision making.

National policy/strategy	Regional planning	Local planning	Programme/Project
Policy alternatives (waste hierarchy)	Waste management options	Location options	Implementation/Timing options
Waste minimisation	Prevention Minimisation	Industry Homes Offices	Implementation of waste minimisation programmes/projects
Reuse	Extend product life	Returnable goods – various	Implementation of waste reuse programmes
Recovery, recycling	Dry recyclables Collection options Organics treatment and processing MBT	Kerbside Bring banks MRF Composting options MBT stabilisation processes/RDF-based process	Specific details of collections, routes, timings, bring-site and civic-amenity management Choice of MRF process
Energy recovery	Incineration with energy recovery RDF Landfill gas utilisation	Incinerator Landfill	Design/Management of energy recovery facilities
Final disposal	Landfill untreated wastes Landfill treated residues	Landfill	Design/Management of energy recovery facilities

MBT, Mechanical Biological Treatment; MRF, Materials Recovery Facility; RDF, Refuse-Derived Fuel.

[European] Community or [national] level, which are relevant to the plan or programme, and the way those objectives and any environmental considerations have been taken into account (Annex 1, SEA Directive).

For waste management planning the list of relevant policies, plans and programmes and their objectives might include air, climate, water, soil, landscape, population and human health and sustainable development. While some of these topics are already being included in waste management planning in Ireland, such as emissions to air and water and impacts on climate change, land use and soils, they will now have to be considered in a different manner due to the influence of SEA. Specifically, policy objectives and their associated targets now have the opportunity to be integrated into waste management planning through the SEA process and not simply some vague aspirations as has been the situation to date. For example, waste in Ireland accounts for 2.5% of total greenhouse gas (GHG) emissions (DoEHLG, 2007). The objectives and targets of the *National Climate Change Strategy* (DoEHLG, 2007) can be directly

integrated into the SEA of waste management planning with a view to achieving our international obligations. Similarly, many other pressing environmental obligations can also be progressed in this way, including those listed in [Table 5.5](#).

The setting of environmental objectives of relevance to the plan and its alternatives are not only influenced by the policy context within which the plan or programme sits, but are also strongly influenced by the nature of the environmental data emerging from the baseline assessment element of the SEA.

5.4.5 *Identification of existing and potential environmental issues; evidence from the baseline*

The baseline environment is the current environment and the likely future environment in the absence of a proposed plan or programme (Therivel, 2004). Baseline information provides the basis for predicting and monitoring environmental effects and helps to identify environmental problems and alternative ways of dealing with them (ODPM, 2005).

Table 5.5. Some environmental policies and objectives of relevance to Irish waste management Strategic Environmental Assessments (SEAs).

Topic	Policy/Plan/Programme	Relevant environmental protection objectives
Biodiversity (flora and fauna)	UN Convention on Biological Diversity (1992) EU Habitats Directive (92/43/EEC) The EU Birds Directive (79/409/EEC) National Biodiversity Plan (2002) Local Biodiversity Action Plans (various)	Maintain and enhance biodiversity Protection of certain habitats and species Designation of Special Protection Areas for birds The enhancement and conservation of biodiversity
Water	Water Framework Directive (2000/60/EC) River Basin District Management Plans (various in preparation)	Achieve at least 'good status' in all waters by 2015 Establish an integrated monitoring and management system for all waters within a River Basin District
Climate/Air	Kyoto Protocol (1997) National Climate Change Strategy (2007) Air	Combat climate change Objectives include the reduction of national greenhouse gas emissions
Human health and population	The EU Environment and Health Strategy 2004–2010 (first period) EU Major Accident (Seveso) Directive (96/82/EC)	Prevent and reduce the impacts of pollution on human health Prevent major accidents
Cultural heritage	European Landscape Convention (2000) National Heritage Plan (2002)	Protect landscapes Protection and management of heritage
Sustainable development	The 6th Environmental Action Programme (2002–2012) National Sustainable Development Strategy(1997)	Sustainable development of Europe Development in Ireland to occur in a sustainable manner

In waste management planning baseline studies, the emphasis to date has been on a description of the environment in relation to air and climate, geology, economic activity, transport infrastructure, groundwater and landscape. However, with the addition of SEA the existing environment must now be considered in relation to the topics set out in Annex 1 of the Directive: biodiversity (flora and fauna), population, human health, soil, water, air, climatic factors, material assets, cultural heritage (including architectural and archaeological heritage), landscape, and the interrelationship between these factors. While not all of these topics might be relevant at all levels of decision making, reasons should be given as to why they are not being considered at the level of the plan under consideration.

The baseline assessment in the context of waste is important as it allows practitioners to determine the current state of the environment and in particular how it is being impacted upon by ongoing waste management infrastructure and practices such as landfill, incineration, recycling facilities, emissions and transport. In addition the assessment also allows for the identification of any significant environmental effects and existing resources that need to be addressed as a matter of priority in the waste strategy.

The consideration of the baseline environmental issues (existing and potential) must also form part of the criteria by which alternatives are developed. By including environmental issues at the outset, existing pressures on the environment can be identified. If these issues can potentially be exacerbated by the proposed waste strategy or new issues generated, opportunities now exist to factor this information into the development of alternatives. In this way the alternatives developed are sensitive to existing and potential environmental issues, which might result from the implementation of the strategy and can in certain circumstances be used to mitigate existing or potential impacts.

The identification of existing and potential environmental issues as a result of the waste strategy should allow practitioners to begin to identify alternatives that are more sustainable in the longer term.

5.4.6 Sustainability

For some commentators, SEA is recognised as a means of incorporating environmental issues into policy, plan and programme decision-making processes and thereby contributing to sustainability (Noble, 2002; Dalal-Clayton and Sadler, 2005). Specifically, this includes the design of environmentally sustainable policies and plans and the identification of more long-term, sustainable alternatives (Partidario, 2000; Therivel, 2004). To progress the goal of sustainable alternatives, specific sustainability decision criteria should be included in their development (Gibson *et al.*, 2005). By including such criteria, all policy and development objectives are considered together and trade-offs are addressed directly such that best options and not just acceptable options are achieved (Gibson, 2006).

The notion of sustainability within waste management has come to mean different things to different stakeholders with different environmental, economic and societal considerations given greater or lesser prominence (Furedy, 1990; Bruce, 1998; Tammemagi, 1999; Petts, 2000; OECD, 2002).

In Ireland, national waste policy is underpinned by a notion of sustainability, which advocates an integrated approach to waste management. However, as discussed in [Chapter 3](#), the RWMP waste scenarios have tended to focus on the lower tiers of the waste hierarchy and predominantly on alternatives for the final disposal of waste. If a more sustainable approach to waste management is to be pursued, the full range of alternatives as set out in the waste hierarchy must be addressed. In this respect, SEA now has a substantial role to play in the development of more sustainable alternatives by including the full range of options available from all the tiers of the waste hierarchy. Strategic environmental assessment will allow for different options to be included in the discussion around waste management in view of the prevailing environmental and social context.

5.4.7 Consultation

The requirements for consultation under the SEA Directive are specific and set out who should be consulted and when. At a minimum, statutory authorities (in Ireland these are the Department of the

Environment, Heritage and Local Government, the Department of the Marine and Natural Resources, and the Environmental Protection Agency) and the public should be given an early and effective opportunity within appropriate time frames to express their opinions. Opportunities for consultation exist during scoping, release of the draft plan and in transboundary situations. The results of consultation must be taken into account during the preparation of the plan and before its adoption.

Consultation in relation to waste management planning has been restricted to date. Under the Waste Management Acts the public are allowed to make representations within a 3-month period and before the adoption of a plan. However, to date, public consultation in relation to waste management has been ineffective and passive (Davies, 2003). The development of Regional Waste Strategies has been on traditional lines, with communities being included after the plans have been constructed (Morrissey, 2004).

The more robust consultation requirements of the SEA process will be a challenge for waste management planning in Ireland. Not only has the process to include a wider number of stakeholders (including transboundary stakeholders) but their views and opinions must be accounted for. At a very minimum, this will allow opposing and diverse views to be articulated through the SEA process.

5.4.8 *Timing*

Under the Directive there is a requirement that SEA “shall be carried out during the preparation of a plan or programme and before its adoption” (Article 4.1). To be fully effective the SEA must be timed to run in parallel with the plan-making process, which will allow for interventions to be made in an effective manner. The logic behind conducting the SEA and the plan-making processes in tandem allows for the proper consideration of environmental data and the rigorous consideration of plan alternatives. A *post-hoc* SEA for a plan does not allow it to influence key decisions, which defies the central objectives of the Directive. As Therivel and Walsh (2006) argue, the consideration of alternatives is the one aspect of SEA that cannot be effectively ‘retrofitted’.

The ‘early and effective’ consideration of alternatives within waste management planning will be a challenge for waste management planning in Ireland. There is a possibility that the waste scenarios developed in the original RWMPs will be inherited by subsequent plan reviews and will be subject to *post-hoc* assessment through tools such as life-cycle assessment (LCA). For example, in the review of the Midlands Waste Management Plan (2005–2010), the original waste scenarios were not changed, because it was argued that European and national waste policy had not changed significantly in the intervening period and the scenarios were modelled on a 15-year lifespan (1998–2013).

6 Overall Conclusions

The primary aims of this research were to develop guidance on the identification and development of alternatives within SEA for use in land-use planning and waste management planning. Specifically, this involved:

1. The development of generic alternatives decision criteria
2. The development of an alternatives decision-support framework
3. The application of the approach to waste management planning.

The key first point from the research was the development of generic alternatives decision criteria for use in an Irish context. The set developed represents a structured, criteria-based approach for the identification of alternatives within SEA, which will lead to the generation of options that satisfy the requirements of the Directive, meet international and national standards and help advance the sustainability agenda. In particular, the criteria will lead to the development of alternatives that are:

1. Appropriate to the scale (national, regional, county, local) and level (policy, plan, programme) of decision making
2. Able to deal with the current and potential issues identified through the baseline study and/or achieve the sustainability objectives or visions for the plan
3. Developed through discussion and dialogue.

Thus, in a very real way, the set of criteria developed within this research project has the potential to generate alternatives that are feasible, legal and sustainable. The criteria will be of most benefit to decision makers when used at the beginning of the plan-making process, when no decisions have been taken and when all options are still on the table for consideration.

In utilising the criteria in the development of alternatives, the decision-making process can be further documented and provide an audit trail of how and why particular alternatives are retained or eliminated by the process. Accordingly, the decision-making process is further opened to scrutiny, which is central to advancing the goal of sustainability.

The second key point from the research was the development of the decision-making framework for use in the Irish context. Based on the alternatives development criteria, the decision tree represents a logical stepwise approach to further identifying suitable alternatives. The development of such a tool has been endorsed by practitioners interviewed during the course of the research. The framework will lead to the development of alternatives:

1. In a logical sequence of actions
2. That are based on rational decision making
3. That allow for further transparency in decision making
4. That provide for a visible audit trail of the alternatives decision-making process.

The third key point from the research was to apply the generic set of criteria to waste management planning in Ireland with a view to determining if it was of a sufficiently high, yet of practical standard to meet the objectives of the SEA Directive and Irish waste management legislation. In combining the existing waste management criteria with the generic SEA criteria it was determined that:

1. The combined set of criteria would be sufficiently robust to meet both the main SEA objectives and those of waste management planning in Ireland
2. Different types of alternatives may be available in specific situations
3. Different combinations of the criteria may be appropriate to different tiers of decision making.

Overall, the alternatives decision-making criteria and decision framework provide a simple and logical method for identifying reasonable alternatives for use in SEAs of different sectors. Since the identification, description and evaluation of reasonable alternatives is a central but highly challenging SEA exercise, it has been useful to establish a methodology for their development. Perhaps, more importantly in following the approach set out, opportunities now exist to enhance the central aim of SEA: the achievement of sustainable development through the integration of environmental considerations into plan and programme making. In addition, in utilising this transparent and user-friendly approach, the potential for environmental conflict should be mitigated, which will further lead to the efficient use of time and resources.

However, from a practitioner's perspective in utilising this approach, some changes to work practices and institutional behaviour will be necessary. Firstly, as the method advocates an approach to the development of alternatives that is based on dialogue and consultation, this will necessitate that all stakeholders with an interest in SEA are invited to participate and give their opinions very early in the decision-making process. This will mean that all alternatives are open for discussion and not simply those that might be the preconceived favourites. If done properly, this will mean that SEAs that are undertaken late in the decision-making process and which attempt to develop alternatives as 'add-ons' should be easily identified as

such, and their value to the decision opened up to question or challenge. In addition, in utilising the approach, it will mean that untenable or 'red herring'-type alternatives are not kept in the process simply because they fill the page or look good on paper. In this way 'real' alternatives will make it to the table. In utilising an approach that is evidence based (guided by evidence from the baseline assessment), the possibility of political interference with the process is lessened. As one consultant pointed out during the interview process, any tool that is based on evidence cannot be logically overturned without a pretty good explanation.

From an institutional perspective, the approach represents a tool of sustainable decision making, in which real and substantive options are brought to the table in an effort to guide decision making that supports all constituencies. For this to happen institutions will have to embrace the changes suggested.

In addition, not only can the criteria and framework be used to generate alternatives but it can also be used as a method to test the effectiveness of SEA, and the quality of alternatives in particular. Given its simplicity, the criteria can be used as a checklist to test the authenticity of alternatives included for consideration in plans that have been previously developed. In this way the criteria can be used by practitioners to make the development of alternatives more proactive, more strategic, more sustainable and less political.

7 Recommendations

Based on the main conclusions of this research a number of recommendations can be made. At the procedural level, the approach should be used as part of the decision-making tool kit utilised by SEA practitioners in the development of alternatives.

Recommendation 1: The criteria and decision-support framework should be used by all SEA practitioners in the development of alternatives. In utilising the approach, a set of 'real' alternatives should emerge, which support an evidence-based approach and meet EU and national legislative requirements.

In addition, it would be useful if the method was included in any upcoming revisions of national SEA guidelines. In this manner, the method would find the widest audience base nationally.

Recommendation 2: The approach should be incorporated into any revisions that will be made of national SEA guidelines.

From a substantive basis, the method should be used in the assessment of SEA quality and effectiveness. As part of Ireland's commitment to the SEA process, a quality review checklist had already been developed to test the effectiveness of the process from a procedural perspective. However, in time and in keeping with

international best practice, a substantive quality review of SEA effectiveness will be needed to test whether or not the process is leading to improved environmental decision making and hence to sustainability. As a first step in this process, the method developed in this research could represent a vital step in testing the substantive effectiveness of SEA in Ireland. From a methodological perspective, the criteria could be used as a checklist against which alternatives can be assessed for robustness.

Recommendation 3: The method should be used to test the substantive effectiveness of SEA in Ireland.

In sum then, the main recommendation from this research is that the criteria and decision framework should be used by SEA practitioners to generate alternatives that are 'real', robust and meet national and EU policy and legislative requirements. While the combinations or bundling of criteria will invariably differ for sectors, scales and levels of decision making, in utilising the approach reasonable alternatives will be generated. In addition, at a minimum, the criteria can be used by practitioners and assessors of SEA to test for the quality of alternatives generated and for the effectiveness of the process. However, while seeming simple, in practice some institutional and behavioural change will be necessitated by practitioners if the method is to be properly utilised.

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Appendix 1 Significant Publications from the Fellowship

Relevant peer-reviewed publications

- Desmond, M., 2005. The waste crisis and sustainable waste management in Ireland. *Chimera* **20**: 15–20.
- Desmond, M., 2006. Municipal solid waste in Ireland: assessing for sustainability. *Irish Geography* **39(1)**: 25–36.
- Desmond, M., 2006. The development of alternatives in SEA; case study of an Irish waste management plan. *Conference Proceedings International Association of Impact Assessment*.
- Desmond, M., 2006. All at SEA: strategic environmental assessment a new tool for environmental decision making. *Chimera* **21**: 38–48.
- Desmond, M., 2007. Decision criteria for the identification of alternatives in Strategic Environmental Assessment (SEA). *Impact Assessment and Project Appraisal* **25(4)**: 259–269.
- Desmond, M., 2007. Strategic Environmental Assessment (SEA): new sustainability tool for environmental decision making. *Irish Geography* **40(1)**: 56–67.
- Desmond, M., 2008. Identification and development of waste management alternatives for Strategic Environmental

Assessment (SEA). *Environmental Impact Assessment Review* **28** (in press).

- Desmond, M., 2008. Decision support framework for the identification of alternatives in Strategic Environmental Assessment. *Impact Assessment and Project Appraisal* (in review).
- Desmond, M. and Egan, D., 2008. Integration of environmental policies through the spatial planning process: the case for Strategic Environmental Assessment (SEA) and the Water Framework Directive (WFD). *An Pleanail* **13(1)**: 10–16.
- Desmond, M. and Fahy, F., 2005. Communicating sustainability: an ecological footprint approach. *Geographical Viewpoint* **33**: 34–40.

Other publications

- Desmond, M., 2005. Sustainable waste management in Ireland. *UCC News*, March.
- Desmond, M., 2007. The role of SEA in environmental decision making. *UCC News*, April.

Appendix 2 Summary of Presentations Given

Date	Location	Presentation title
November 2007	Galway City Council	SEA Alternatives for Waste Management Planning
June 2007	IAIA-Korea	Decision-Support Framework for the Development of Alternatives in SEA
May 2007	Conference of Irish Geographers, UCD	Criteria for the Development of Alternatives within SEA
March 2007	Department of Geography, UCC	The Effectiveness of SEA in Ireland
February 2007	Department of Geography, Planning seminar	SEA and Land-Use Planning in Ireland
February–March 2007	Department of Geography, UCC	Series of 4 SEA lectures (methodologies, approaches, research findings)
November 2006	EPA, Dublin	Quality Review Criteria for SEA in Ireland
September 2006	Galway City Council	Development of Alternatives in SEA
May 2006	IAIA-Norway	Alternatives, Options and Scenarios in Strategic Environmental Assessment: A Waste Management Case Study
May 2006	Conference of Irish Geographers, UCD	The Consideration of Alternatives within Strategic Environmental Assessment
April 2006	EPA, Dublin	The Use of Indicators in the Assessment of SEA Alternatives
February–March 2006	Department of Geography, UCC	Series of 4 SEA lectures (methodologies, approaches, research findings)
February 2006	Cork City Council	SEA and the Planning Process
February 2006	Cork County Council	SEA and the Planning Process
February–March 2006	Department of Geography, UCC	Series of 4 SEA lectures (methodologies, approaches, research findings)
January 2006	ENVIRON2006, UCD	Identifying Alternatives for Use in Strategic Environmental Assessment
October 2005	Cork City Council, waste services	Implementation of Waste Management Planning in Ireland
September 2005	Conference of British Geographers, London	Assessing for Sustainable Waste Management in Ireland
May 2005	Conference of Irish Geographers, NUI Galway	Scenarios of Household Waste Management to 2010
March 2005	Department of Geography, UCC	Series of 3 waste management lectures (methodologies, approaches, research findings)
February 2005	Department of Geography Seminar, UCC	Waste Planning in Ireland: A Progress Report

Appendix 3 Main Outputs from the Project

1. Decision-support criteria for the development of alternatives in SEA
2. Decision-support framework for the development of alternatives in SEA
3. Significant publications
4. Dissemination of findings through conferences, presentations, seminars
5. Inclusion of SEA approach to undergraduate teaching in environmental management in UCC
6. Co-author of EPA SEA Quality Review Guidelines (forthcoming)
7. Part of national/international SEA network
8. Potential for additional SEA-related research
9. Potential for including SEA module at postgraduate-level teaching in UCC

Appendix 4 Survey Questionnaire and Questions Asked

Question 1

Environmental planning, SEA and the development of alternatives

- Q1.1: Does SEA have a role to play in the development of planning alternatives? Y/N
- Q1.2: Should alternatives be used to solve existing problems, provide solutions to plan objectives or can they do both?
- Q1.3: Do you think that existing criteria are sufficient for the development of alternatives? Y/N
- Q1.4: Do you think that in working through the SEA process any new criteria should be used when developing alternatives? Y/N

Question 2

Potential alternatives development criteria

- Q2.1: Is a sustainability criterion (e.g. cost-effectiveness, social acceptability, technical feasibility) appropriate? Y/N
- Q2.2: Do the alternatives address existing environmental problems? Y/N
- Q2.3: Can the alternatives address potential environmental problems? Y/N
- Q2.4: Is the alternative informed by existing environmental objectives? Y/N
- Q2.5: Is the alternative 'reasonable', i.e. does it fall within the legal and geographic scope of the plan? Y/N
- Q2.6: Has the hierarchy of options ranging from need, method, location and timing been considered?
- Q2.7: Have the alternatives available within the tier of decision making been accounted for? Y/N
- Q2.8: Has the policy 'path dependency' (a policy route been established which forecloses certain other options) been made explicit within the alternatives? Y/N
- Q 2.9: Has consultation (internal, external, statutory consultees) been used to generate alternatives? Y/N
- Q2.10: Has the timing of the development been 'early and effective'? Y/N

Question 3

Potential decision tree

- Q3.1: Do you think the criteria could form the basis of a decision-making tree to be used in the development of alternatives? Y/N
- Q3.2: Would such a decision-making tree be useful for the development of alternatives? Y/N

An Ghníomhaireacht um Chaomhnú Comhshaoil

Is í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) comhlachta reachtúil a chosnaíonn an comhshaol do mhuintir na tíre go léir. Rialaímid agus déanaimid maoirsiú ar ghníomhaíochtaí a d'fhéadfadh truailliú a chruthú murach sin. Cinntímid go bhfuil eolas cruinn ann ar threochtaí comhshaoil ionas go nglactar aon chéim is gá. Is iad na príomh-nithe a bhfuilimid gníomhach leo ná comhshaol na hÉireann a chosaint agus cinntiú go bhfuil forbairt inbhuanaithe.

Is comhlacht poiblí neamhspleách í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) a bunaíodh i mí Iúil 1993 faoin Acht fán nGníomhaireacht um Chaomhnú Comhshaoil 1992. Ó thaobh an Rialtais, is í an Roinn Comhshaoil agus Rialtais Áitiúil a dhéanann urraíocht uirthi.

ÁR bhFREAGRACHTAÍ

CEADÚNÚ

Bíonn ceadúnais á n-eisiúint againn i gcomhair na nithe seo a leanas chun a chinntiú nach mbíonn astuithe uathu ag cur sláinte an phobail ná an comhshaol i mbaol:

- áiseanna dramhaíola (m.sh., líonadh talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh., déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- diantalmhaíocht;
- úsáid faoi shrian agus scaoileadh smachtaithe Orgánach Géinathraithe (GMO);
- mór-áiseanna stórais peitreal.

FEIDHMIÚ COMHSHAOIL NÁISIÚNTA

- Stiúradh os cionn 2,000 iniúchadh agus cigireacht de áiseanna a fuair ceadúnas ón nGníomhaireacht gach bliain.
- Maoirsiú freagrachtaí cosanta comhshaoil údarás áitiúla thar sé earnáil - aer, fuaim, dramhaíl, dramhuisce agus caighdeán uisce.
- Obair le húdaráis áitiúla agus leis na Gardaí chun stop a chur le gníomhaíocht mhídhleathach dramhaíola trí chomhordú a dhéanamh ar líonra forfheidhmithe náisiúnta, díriú isteach ar chiontóirí, stiúradh fiosrúcháin agus maoirsiú leigheas na bhfadhbanna.
- An dlí a chur orthu siúd a bhriseann dlí comhshaoil agus a dhéanann dochar don chomhshaol mar thoradh ar a ngníomhaíochtaí.

MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN GCOMHSHAOL

- Monatóireacht ar chaighdeán aer agus caighdeáin aibhneacha, locha, uisce taoide agus uisce talaímh; leibhéil agus sruth aibhneacha a thomhas.
- Tuairiscíú neamhspleách chun cabhrú le rialtais náisiúnta agus áitiúla cinntiú a dhéanamh.

RIALÚ ASTUITHE GÁIS CEAPTHA TEASA NA HÉIREANN

- Cainníochtú astuithe gáis ceaptha teasa na hÉireann i gcomhthéacs ár dtiomantas Kyoto.
- Cur i bhfeidhm na Treorach um Thrádáil Astuithe, a bhfuil baint aige le hos cionn 100 cuideachta atá ina mór-ghineadóirí dé-ocsaíd charbóin in Éirinn.

TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde ar shaincheisteanna comhshaoil a chomhordú (cosúil le caighdeán aer agus uisce, athrú aeráide, bithéagsúlacht, teicneolaíochtaí comhshaoil).

MEASÚNÚ STRAITÉISEACH COMHSHAOIL

- Ag déanamh measúnú ar thionchar phleananna agus chláracha ar chomhshaol na hÉireann (cosúil le pleananna bainistíochta dramhaíola agus forbartha).

PLEANÁIL, OIDEACHAS AGUS TREOIR CHOMHSHAOIL

- Treoir a thabhairt don phobal agus do thionscal ar cheisteanna comhshaoil éagsúla (m.sh., iarratais ar cheadúnais, seachaint dramhaíola agus rialacháin chomhshaoil).
- Eolas níos fearr ar an gcomhshaol a scaipeadh (trí cláracha teilifíse comhshaoil agus pacáistí acmhainne do bhunscoileanna agus do mheánscoileanna).

BAINISTÍOCHT DRAMHAÍOLA FHORGHNÍOMHACH

- Cur chun cinn seachaint agus laghdú dramhaíola trí chomhordú An Chláir Náisiúnta um Chosc Dramhaíola, lena n-áirítear cur i bhfeidhm na dTionscnamh Freagrachta Táirgeoirí.
- Cur i bhfeidhm Rialachán ar nós na treoracha maidir le Trealamh Leictreach agus Leictreonach Caite agus le Srianadh Substaintí Guaiseacha agus substaintí a dhéanann ídiú ar an gcrios ózóin.
- Plean Náisiúnta Bainistíochta um Dramhaíl Ghuaiseach a fhorbairt chun dramhaíl ghuaiseach a sheachaint agus a bhainistiú.

STRUCHTÚR NA GNÍOMHAIREACHTA

Bunaíodh an Ghníomhaireacht i 1993 chun comhshaol na hÉireann a chosaint. Tá an eagraíocht á bhainistiú ag Bord lánaimseartha, ar a bhfuil Príomhstíúrthóir agus ceithre Stíúrthóir.

Tá obair na Ghníomhaireachta ar siúl trí ceithre Oifig:

- An Oifig Aeráide, Ceadúnaithe agus Úsáide Acmhainní
- An Oifig um Fhorfheidhmiúchán Comhshaoil
- An Oifig um Measúnacht Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáide

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag ball air agus tagann siad le chéile cúpla uair in aghaidh na bliana le plé a dhéanamh ar cheisteanna ar ábhar inní iad agus le comhairle a thabhairt don Bhord.

Science, Technology, Research and Innovation for the Environment (STRIVE) 2007-2013

The Science, Technology, Research and Innovation for the Environment (STRIVE) programme covers the period 2007 to 2013.

The programme comprises three key measures: Sustainable Development, Cleaner Production and Environmental Technologies, and A Healthy Environment; together with two supporting measures: EPA Environmental Research Centre (ERC) and Capacity & Capability Building. The seven principal thematic areas for the programme are Climate Change; Waste, Resource Management and Chemicals; Water Quality and the Aquatic Environment; Air Quality, Atmospheric Deposition and Noise; Impacts on Biodiversity; Soils and Land-use; and Socio-economic Considerations. In addition, other emerging issues will be addressed as the need arises.

The funding for the programme (approximately €100 million) comes from the Environmental Research Sub-Programme of the National Development Plan (NDP), the Inter-Departmental Committee for the Strategy for Science, Technology and Innovation (IDC-SSTI); and EPA core funding and co-funding by economic sectors.

The EPA has a statutory role to co-ordinate environmental research in Ireland and is organising and administering the STRIVE programme on behalf of the Department of the Environment, Heritage and Local Government.