

Appendix D. Development of a framework for practical and effective environmental labelling

Final Report for Defra Project FO0419


Effective approaches to environmental labelling of food products

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Executive Summary

The objective of Approach 4 was to identify guidelines for a credible and robust label that is effective and practical via the development of a framework for environmental labelling of food products. The evidence gathered in literature review, analysis of environmental impacts and consultation exercise has been distilled into 14 guidelines which constitute a framework for practical and effective labelling. The purpose of this framework is to provide a basis for identifying opportunities to improve existing (or designing new) labelling initiatives from the perspective of practicality and effectiveness. The guidelines within the framework can be used by those examining labelling schemes (in industry or government) to make an assessment of the scheme with respect to its practicality and effectiveness in order to determine, for example, how a scheme might be improved for achieving specific outcomes. Alternatively it can be used at the design stage of a new scheme to help ensure that the scheme is designed in such a way that it is cost-effective.

The guidelines encompass objectives and purpose, mechanisms and drivers, practicalities and communication and include:

- The objectives and purpose of the scheme need to be clear and transparent
- The impact categories covered by the scheme or label need to be clearly stated
- The performance metrics need to be clearly identified
- The mechanisms by which the objectives will be achieved need to be clearly identified and understood
- The labelling scheme should complement other initiatives that tackle the same issues and clearly identify any additional benefits specifically provided by the scheme
- The role of practice-based and outcome-based targets and drivers and their relationship with the achievement of scheme objectives needs to be clearly understood
- Use the best available techniques for measuring and assessing impacts that are robust and credible
- Aggregation of impact data should respect the limits of the established techniques that are available
- The cost of establishing, administering, managing and participating in the labelling scheme needs to be equitable and commensurate with any potential benefits
- The burden on industry with respect to scheme application, administration, bureaucracy, verification and inspections needs to be equitable and commensurate with any potential benefits
- Communication should be tailored for different target audiences
- Communication of impacts should be based on data that has been credibly and transparently aggregated (C2)
- Methods of communicating impacts on a label should be as simple as possible
- The boundaries of what the label covers needs to be clearly communicated

Four existing labelling schemes have been used to illustrate each of the guidelines in the framework. The schemes were selected to provide a range of different approaches in different countries, so that the capacity of the framework to explore the advantages and disadvantages of different approaches could be assessed. This showed that the framework can clearly identify the differences between the outcome and practice based schemes and has to some extent looked more favourably on those that have a more outcome-based approach. This is because the framework is endeavouring to highlight schemes that practical, effective, robust and credible. Practice-based schemes do well in relation to practicality, but they do not perform so well with respect to effectiveness (as this is largely unknown) and consequently this raises doubt over credibility and robustness. Therefore it seems that practice-based schemes need to be improved to the extent that they can demonstrate they are effectively delivering outcomes, and outcome-based schemes need to be made more practical and less costly, so that any outcomes delivered are commensurate with the cost of delivery.

1.0. Introduction

The objective of the work undertaken in this task was to identify guidelines for a credible and robust label that is effective and practical for consumers and industry via the development of a framework for practical and effective environmental labelling of food products.

A key aim of this project was to provide an analysis of the practicalities, effectiveness and feasibility of environmental labelling of food. The literature review, analysis of environmental impacts and consultation exercise identified the issues involved with respect to scientific and technical approaches to environmental labelling, the potential of such a label as a driver for change both in terms of the behaviour of consumers and stakeholders in the supply chain and the likely costs and benefits to the industry. This task aimed to distil and integrate the key findings from the previous project tasks into a logical and systematic framework to generate a set of guidelines that any labelling scheme for food should aim or aspire to address. In so doing this would provide a framework for a practical and effective labelling scheme for food.

The purpose of this framework is to provide a basis for identifying opportunities to improve existing (or designing new) labelling initiatives from the perspective of practicality and effectiveness. The guidelines within the framework can be used by those examining labelling schemes (in industry or government) to make an assessment of the scheme with respect to its practicality and effectiveness in order to determine, for example, how a scheme might be improved. Alternatively it can be used at the design stage of a new scheme to help ensure that the scheme is designed in such a way that it is cost-effective.

The findings of the literature review, analysis of environmental impacts and consultation exercise are very diverse, covering environmental, social and economic aspects, so distilling them into a common framework and set of guidelines has not been an easy task, especially as many aspects are interrelated. However, a generic framework has been developed and is explained below.

2.0. Overview of the framework

Figure 1 provides an overview of the key aspects, interactions and potential role that an environmental label may have. This is a very simplified perspective, but it provides a clear basis for understanding how a label may operate in the context of consumers, industry and ultimately the impact on the environment from consumption and production.



Figure 1: Core aspects for environmental labelling of food and an overview of their interactions

The context in which the label is operating is a key consideration that permeates through the guidelines, which have been broadly grouped together into four groups as outlined below:

| | |
|--------------------------------|---|
| Objectives and purpose: | Clearly defining the objectives and purpose of the label will set clear boundaries and scope and also determine what it should achieve. Thus this will set the foundations for determining its effectiveness. |
| Mechanisms and drivers: | Understanding the processes for change and how the labelling scheme will bring about changes that will ultimately deliver the scheme's objectives is crucial. For example, understanding how behavioural changes will impact upon environmental outcomes. |
| Practicalities: | It is important to understand the limitations of what can be achieved both in terms of the science to underpin the scheme and the cost of its implementation versus the potential benefits. |
| Communication: | How the information gathered by the scheme is communicated to end audiences or users of the information will undoubtedly influence its success. Communication techniques may vary depending on the drivers and mechanisms that are utilised. |

These four groups and their respective guidelines are interrelated as shown in Figure 2.

3.0. Guidelines for practical and effective environmental labelling of food

3.1. Overview

From the precursor work undertaken during the project fourteen guidelines have been identified across the 4 groups as shown in Table 1.

| Table 1: Overview of guidelines for practical and effective environmental labelling of food | |
|---|---|
| Guideline | Title |
| Objectives and purpose | |
| O1 | The objectives and purpose of the scheme need to be clear and transparent. |
| O2 | The impact categories covered by the scheme or label need to be clearly stated. |
| O3 | The performance metrics need to be clearly identified. |
| Mechanisms and drivers | |
| M1 | The mechanisms by which the objectives will be achieved need to be clearly identified and understood. |
| M2 | The labelling scheme should complement other initiatives that tackle the same issues and clearly identify any additional benefits specifically provided by the scheme. |
| M3 | The role of practice-based and outcome-based targets and drivers and their relationship with the achievement of scheme objectives needs to be clearly understood. |
| Practicalities | |
| P1 | Use the best available techniques for measuring and assessing impacts that are robust and credible. |
| P2 | Aggregation of impact data should respect the limits of the established techniques that are available (i.e. data should not be aggregated to the extent that it becomes meaningless). |
| P3 | The cost of establishing, administering, managing and participating in the labelling scheme needs to be equitable and commensurate with any potential benefits. |
| P4 | The burden on industry with respect to scheme application, administration, bureaucracy, verification and inspections needs to be equitable and commensurate with any potential benefits |
| Communication | |
| C1 | Approaches to communication should be different depending on the target audience. |
| C2 | Communication of impacts should be based on data that has been credibly and transparently aggregated. |
| C3 | Methods of communicating impacts on a label should be as simple as possible. |
| C4 | The boundaries of what the label covers needs to be clearly communicated. |

An important aspect to acknowledge is that many of these guidelines are interlinked, and these links determine the practicality and effectiveness of any potential or existing label. Figure 2 shows the interrelationships between the guidelines. It can clearly be seen that the relationship between the guidelines is complex. However, explicitly highlighting these interrelationships provides a better understanding of what constitutes a practical and effective label as this is dependent on some of the choices that are made within each of the guidelines.

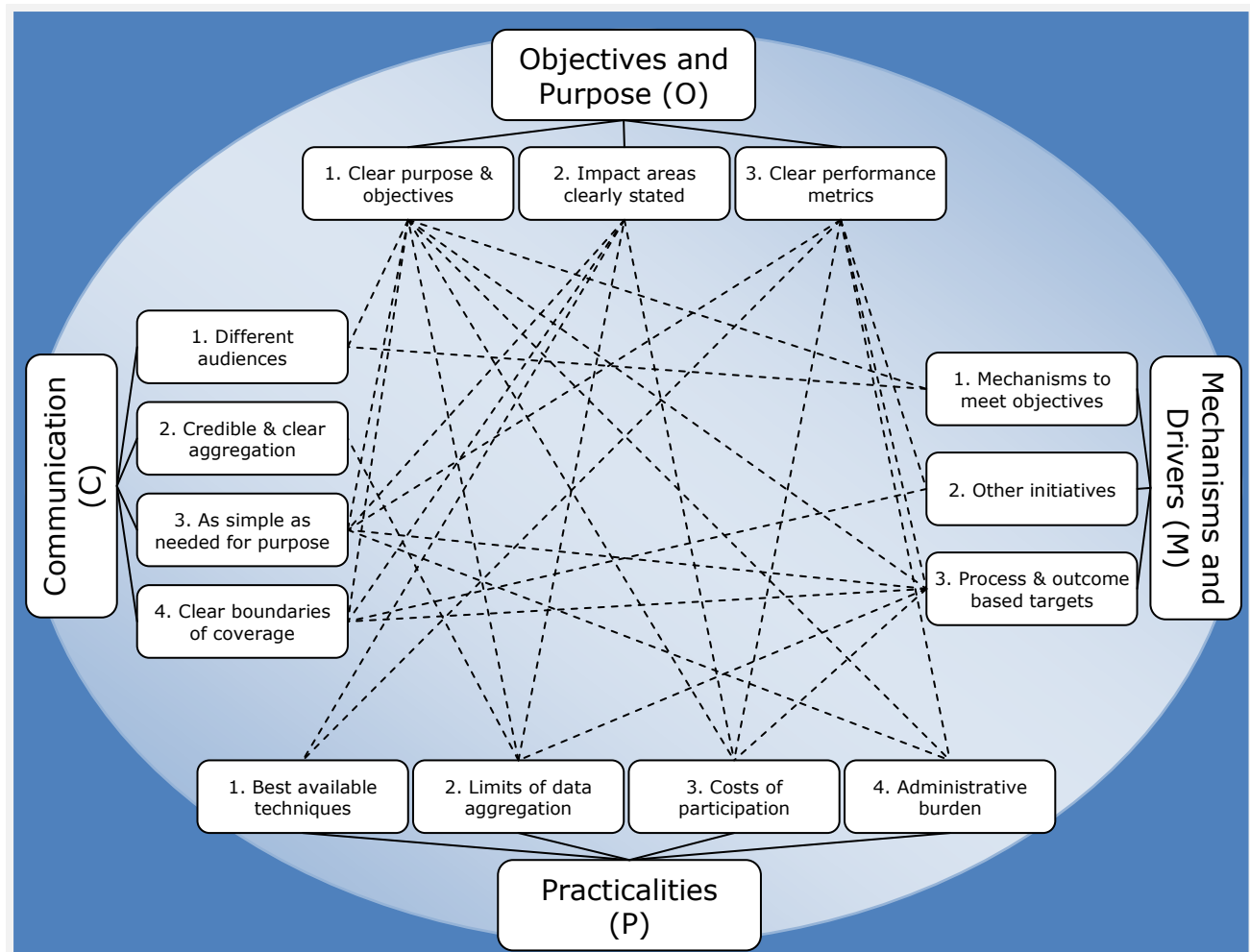


Figure 2: Interrelationships between the guidelines (the "cats cradle")

The following section outlines each of the guidelines in detail, including the relationship with other guidelines, and also highlights the basis of the guidelines with respect to the evidence gathered in the literature review, analysis of environmental impacts and consultation exercise. The framework has been applied to four labelling schemes, which have been selected to provide examples of different approaches in different countries, so that the capacity of the framework to explore the advantages and disadvantages of different approaches can be demonstrated. The schemes are (full details of each of these schemes can be found in Appendix A):

- Stichting Milieukeur (Netherlands)
- Earthsure (USA)
- Indice Carbone (France)
- LEAF Marque (UK)

Examples from this framework application process have been used to illustrate each of the guidelines in the framework below. The application of the framework to identify opportunities for improving the schemes is not presented here as the purpose of the application is only to illustrate the guidelines and framework, and the value of any improvements would have to be considered against the expected outcomes.

3.2. Objectives and purpose

Guideline O1: The objectives and purpose of the scheme need to be clear and transparent.

Determining the purpose of the scheme is a key aspect for determining what other guidelines should apply. For example, the purpose of the labelling scheme may be:

- To market 'greener' products to obtain a market advantage and/or a price premium;
- To raise consumer awareness of the environmental impacts of their food and enable more informed purchase decisions;
- To address specific environmental issues; or
- All of the above

If the purpose of the label is purely for marketing, then the Defra's guidance for making 'green claims' (Defra, 2003) probably applies rather than guidelines described herein, although there is scope to utilise the guidelines to help support and improve the reputation of a marketing-oriented label. However, if the purpose is to address specific environmental issues, then the following guidelines O2 and O3 may also apply.

The purpose and objectives of the scheme also relate to the mechanisms by which the scheme operates (Guideline M1). Some schemes aim to change consumer purchasing behaviour via labelling which in turn may exert market pressure on industry resulting in a change in industry practices. Other schemes aim to directly change industry behaviour, and others aim to influence both consumer and industry behaviour. This is an important distinction that was identified in the consultation exercise, as changing industry and consumer behaviour are distinct objectives and the options that work best for one will not necessarily work best for the other.

Examples: O1. Purpose and objectives

An example of an existing Type I scheme that was found to have clearly defined objectives, satisfying Guideline O1, is Earthsure. These are given as:

- To provide comprehensive environmental data to purchasers (business and individuals) so that the power of the market can move the economy towards overall environmental improvement.
- To scientifically substantiate a product's environmental claims and demonstrate that such claims are substantial enough to warrant special recognition.

The objective to provide comprehensive 'data' is clearly linked to the Type I LCA approach. However, where an LCA approach is not adopted objectives can still be clearly defined. For example, the LEAF Marque (Type IV) does not measure environmental outcomes but has clear objectives:

- To help develop more sustainable farming systems through the adoption of Integrated Farm Management (IFM);
- To provide growers who adopt environmentally sound farming methods with greater recognition;
- To inform and educate consumers on environmentally sound farming in order to influence their purchasing decisions.

Guideline O2: The impact categories covered by the scheme or label need to be clearly stated.

Guideline O2 lies at the heart of the issue for any environmental label and is particularly relevant to omnilabelling. In theory, any environmental label should be based on the most significant environmental impacts associated with the life cycle of a product or the production system from which it was produced. However, in reality, the choice of impacts is governed by what can be technically measured and assessed (Guideline P1) within the confines of a reasonable cost for data collection (Guideline P3).

There are also arguments, which were raised by some participants in the consultation exercise, to include socio-economic as well as environmental impact categories in order to provide a holistic perspective and one that relates more to sustainability issues. This is quite correct, especially in the context of where an omni-label aims to provide a holistic view of the issues associated with a product, but the same technical and cost issues Guidelines P1 and P2 apply.

The choice of impact categories is also governed by what can be communicated in the context of a label (Guideline C3), which in itself is connected to what the purpose of the label is (Guideline O1). The practicality guidelines also influence what can be communicated, as it may not be possible to cover all the most relevant categories in a single label (due to lack of data, methodologies, expense, difficulties synthesising simple labels, etc.). Therefore it is very important to set out what is covered and what is omitted from the scheme.

Examples: O2. Impact categories

Application of the framework showed that, with respect to food products the practice-based schemes (i.e. Type IV label, which are used for the majority of food eco-labels), impact categories and LCA techniques are not used. This approach has been adopted for reasons of practicality and cost (Guidelines P1, P3 and P4). However, it does mean that Type IV schemes will not meet Guideline O2.

There are examples of schemes where the guideline is fully satisfied. For example, Indice Carbone, clearly states that only one impact category applies, i.e. quantity of greenhouse gases emitted as a result of each product during five key life cycle stages from raw material production to the consumers home and Earthsure uses a full life cycle assessment approach, fully compliant with ISO 14001, to characterise the following impact categories (for a farming component): Climate change; Depletion of the stratospheric ozone layer; Formation of photochemical oxidants ; Airborne toxicity; Aquatic toxicity; Eutrophication; Depletion of fossil energy resources; Depletion of mineral resources; Soil depletion/conservation; Land use and biodiversity; Use of GMOs, hormones and antibiotics.

Guideline O3: The performance metrics need to be clearly identified.

In order to judge how effective a labelling scheme is, performance metrics are required by which to judge any changes in relation to the objectives and purpose of the labelling scheme. The metrics may be outcome or practice-based. For example, are there any specific outcomes the label should contribute to, e.g. reducing emissions, improving water quality, etc. or have practices been changed to required standards. Such metrics need to be clearly identified and form the basis for assessing effectiveness. Additionally, these metrics may be part of the labelling scheme itself, in that they may be used as part of the certification process. As such they are related to Guideline M3 and so it is important to be able to identify how any targets are driving change in relation the scheme objectives (Guideline O1). The metrics are also related to Guideline M2, in that it is crucial to be able to attribute or allocate any changes in the performance metric to the effect of the labelling scheme when other initiatives may also be having an effect.

Guideline O3 is strongly related to Guideline O2, and as such it is also governed by what is technically feasible within reasonable costs (Guidelines P1, P3 and P4).

Examples: O3. Performance metrics

The Earthsure scheme certifies that the product has undergone a life cycle assessment which evaluates the environmental impact of producing and packaging a food product. No Earthsure eco-label will be approved if the product is not better than the average across all environmental impact categories. Requires disclosure of all environmental impact data versus the US average for the given commodity. Product must demonstrate progress towards improved environmental performance. Thus there are clear environmental performance metrics.

As no impact categories are defined for the practice-based schemes of SMK and LEAF Marque (see Guideline O2), there are no environmental performance metrics. The only metrics available are the uptake of the scheme (or market share) and the associated practices that are required to meet scheme standards. For example, in response to an identified gap, LEAF Marque introduced additional standards with respect to water efficiency. Having a water management plan is a critical failure point and as such is a practice-based performance metric. However, having a management plan does not necessarily correlate with improvements in water efficiency. LEAF Marque do now have additional standards to monitor water efficiency, thus providing a measure that is more directly related to the outcome of improved water efficiency, but this is only a recommendation and is not required to be LEAF Marque certified.

3.3. Mechanisms and drivers

Guideline M1: The mechanisms by which the objectives will be achieved need to be clearly identified and understood.

It is important to be clear about which approach the scheme will follow to achieve its objectives. The findings from the consultation exercise identified that changing consumer and industry behaviour often involve different approaches, so this may impact upon the guidelines for communication (Guideline C1). The choice of mechanism is in itself part of the purpose and objectives of the scheme, and as such is connected to Guideline O1.

Whether the objective is to change consumer behaviour, industry behaviour or both, it is important to understand the drivers and processes involved between the changes that are instigated and consequent environmental impacts. If we return to Figure 1, there are various points where interventions can be made, which may have an effect on industry behaviour, consumer behaviour, or both, which in turn may have an effect upon industry practices, which in turn may have an effect and impact on the environment. This 'effect chain' can be simple, but is often very complex with numerous stressors, midpoints, endpoints and damages (Bare and Gloria, 2008; van der Werf, et al., 2009). However, in order to determine how effective a labelling scheme is, it is important to know what impact it has at the point of intervention and what the consequences are in relation to the objectives and metrics identified in Guidelines O2 and O3.

Examples: M1. Mechanisms

SMK and Indice Carbone both clearly aim to meet their objectives by modifying consumer behaviour. In the case of SMK they aim to provide a credible label by which the more environmentally sound products can be identified and Indice Carbone aim to provide clear and detailed information in order to influence consumer shopping decisions at the point of sale. However, SMK also aims to stimulate the development of environmentally beneficial products within industry.

Examples: M1. Mechanisms

Earthsure and LEAF Marque also aim to influence consumer behaviour, however their mechanisms are more geared towards influencing industry behaviour. Earthsure uses Environmental Product Declarations and develops Product Category Rules, which are more geared toward industry communication. These can be used to show interested stakeholders a commitment to environmental sustainability in order to improve market share of the eco-labelled product. However, Earthsure claim that consumers are generally not yet aware of the significance of certain environmental production values, making the label currently more relevant to individual businesses. Therefore Earthsure encourages industry to understand and mitigate its impacts to become market leaders in demonstrating environmental responsibility. The LEAF Marque label aims to provide farmer recognition to consumers, but the underlying initiatives behind the scheme are more geared towards encouraging the adopting of Integrated Farm Management (IFM) practices at the farm level.

Guideline M2: The labelling scheme should complement other initiatives that tackle the same issues and clearly identify any additional benefits specifically provided by the scheme.

It is important to be able to allocate any impacts to the labelling scheme and/or know what other initiatives (mandatory and voluntary) are attempting to achieve the same objectives. For example, a labelling scheme may promote the more efficient use of nitrogen fertiliser, and at the same time the farm may be subject to NVZ regulations (SI 2008/2349 & SI 2009/3160) and inspections. Similarly a scheme may promote a number of best practices with respect to pesticide use which are also being encouraged by the Voluntary Initiative. Therefore the question arises of how to allocate any observed environmental benefits to the labelling scheme, when the NVZ regulations (and inspections) or the activities of the Voluntary Initiative could also be responsible. Hence, it is important to be very clear about what interventions the labelling scheme is implementing, in relation to other initiatives, and what the specific impacts of the interventions are.

Examples: M2. Other initiatives

For many schemes there is little evidence in the public domain that shows how they have been designed to compliment other initiatives that are tackling the same issues. However, there are examples where there is some synergy with other schemes and initiatives. For example, the Indice Carbone approach is consistent with the French Grenelle Environment Round Table objectives of seeking to promote products that impact less on the environment and are more sustainable using a Type III label (see Appendix A, Section 6.3). Also, the LEAF Marque Scheme has been developed to be used in conjunction with other food assurance schemes (e.g. Red Tractor) which are largely concerned with food safety and quality. The LEAF Marque has also been designed to support the wider LEAF activities. Being a practice-based scheme, there overlaps with many other initiatives, for example cross compliance, Voluntary Initiative and entry level stewardship. The integrated farming approach of the scheme does complement such initiatives, but also, as a consequence, it becomes difficult to attribute changes in industry behaviour and any outcomes specifically to the LEAF Marque scheme rather than the other initiatives.

Guideline M3: The role of practice-based and outcome-based targets and drivers and their relationship with the achievement of scheme objectives needs to be clearly understood.

The literature review revealed that practice-based approaches to labelling schemes in the food sector are more common than outcome-based systems. This is due to technical difficulties in the metrics (Guidelines O3 and P1) that were highlighted in the analysis of environmental impacts, and cost and feasibility issues (Guideline P3) that were highlighted in the consultation exercise. However, the analysis of environmental impacts and the consultation exercise also identified that outcome-based targets are essential if we are to judge effectiveness, especially with respect to achieving environmental improvements and making progress

toward more sustainable production and consumption. Therefore, it is important to understand the role and effect that both process and outcome-based targets have in context of the labelling scheme with respect to achieving the objectives (Guideline O1).

Practice-based targets do have an important role to play, provided they clearly align with the scheme objectives. The targets can provide useful tools by which judge the performance of the scheme in relation to its objectives. However, the use of practice-based targets as surrogates for achievement of outcomes should be avoided unless there is very strong empirical evidence providing a clear link between a practice and an outcome. There is also a danger that when practice-based targets are used as surrogates for outcomes achieved that this gets communicated on the scheme label (Guideline C4) when actually the outcomes have not been directly assessed or measured.

Outcome-based metrics and targets can be independent from any particular scheme, such as indicators used to assess the state of the environment. In theory these could be drawn upon as a means of observing any changes in outcomes in relation to the implementation of practice-based schemes. However, there are still issues of the correlation of practices implemented and changes in outcomes, both with respect to the empirical evidence linking them and also the allocation of what is causing the change in outcome, i.e. what other practices or initiatives may be contributing (Guideline M2).

Guideline M3 is also connected to Guideline C3, in that achieving targets may form of the process of obtaining the label/certification, and thus may form part of what is communicated. A key part of this process is the concept of continuous improvement, especially for practice-based targets. A scheme should be dynamic and seek to encourage improvements over time through a process of auditing and action planning. Adopting such a philosophy places a business in a more sustainable position by being more able to respond and adapt.

Examples: M3. Practice and outcome-based targets

Both Earthsure and Indice Carbone use outcome-based targets and relationship with scheme objectives is clear. In the case of practice-based schemes, such as LEAF Marque, outcome-based targets are not widely utilised (see also P1). The scheme assumes that IFM techniques will deliver environmental benefits, but relationship is difficult to define and so environmental benefits and achievements are unknown.

3.4. Practicalities

Guideline P1: Use the best available techniques for measuring and assessing impacts that are robust and credible.

This applies to the techniques for measuring and assessing impacts in different impact categories (environmental, social and economic), and governs Guidelines O2 and O3 with respect to the impact categories that can be used within a labelling scheme and performance metrics used.

The analysis of environmental impacts clearly identified a number of limitations in techniques available for measuring environmental impacts that arise over the life cycle of food production. If the objective of the labelling scheme is to contribute towards reducing negative impacts or increasing positive impacts, it is essential that the techniques used to measure and assess these are robust and scientifically sound. If they are not, and inadequate techniques are used, this could be both detrimental to the credibility of the scheme and/or drive the industry in the wrong direction. The use of poor techniques can result in incorrect metrics (Guideline O3) which in turn can result in incorrect targets (Guideline D3). In a worse case situation, especially if there is a statutory requirement for the label, using an inadequate or scientifically flawed technique could result in a legal challenge.

Therefore, it is important to identify the limitations when considering the impact areas that the labelling scheme should cover (Guideline O2) and the metrics that will be used for targets (Guideline O3). When adequate techniques are lacking, then this needs to be acknowledged and the objectives of the scheme adapted accordingly.

Examples: P1. Best available techniques

Earthsure uses an ISO14001 Life Cycle Assessment approach which is presented as "holistic, the best available hard science and not feel-good environmentalism". Its processes follow international standards for environmental management, measurement and disclosure, where they exist. Where such methods do not exist they use, what they consider to be, the available science currently. Their techniques and assessment methods are constantly reviewed and improved. However, it should be noted that for farms it may take up to three years for the necessary information to be gathered and assessed.

LEAF Marque uses practice-based methods. Environmental impacts are not measured. However, some farm based measurements and outcome focused assessments are now being recommended within the scheme, for example, carbon balancing and the quantification of water use per crop unit. Consequently, some movement towards outcome-based measures can be seen.

Guideline P2: Aggregation of impact data should respect the limits of the established techniques that are available, to remain meaningful

Guideline P2 is derived from the fact that in order to present information about environmental impacts within the confines of a product label, a lot of data and information needs to be aggregated. The analysis of environmental impacts identified that in many instances, especially with respect to damage characterisation in LCA (Bare et al., 2000; Jolliet et al., 2004; Pennington et al., 2004; Sleeswijk et al., 2008; UNEP, 2003), the techniques for aggregating environmental impacts are not sufficiently robust to use with limited (if any) validation and in some cases are still at a prototype stage. As such there are technical limits on what can be aggregated. This governs the impact categories that the label can cover (Guideline O2) and what can be communicated (Guideline C2). Additionally, the inability to aggregate some environmental impacts to an extent suitable for labelling also contributes towards the lack of feasibility of using outcome-based targets (Guideline M3), and results in the use of practice-based targets and data which is either inherently easier to aggregate or used within a system of pass/fail standards.

The degree of aggregation may also be governed by the objectives and purpose of the scheme (Guideline O1). If the objective is to raise awareness and educate consumers, then highly aggregated information may not be conducive to this objective, and it may be necessary to provide more detail beyond a simple label or stamp of certification.

Examples: P2. Limits of data aggregation

For Earthsure, aggregation undertaken is limited to those impact categories where international standards and scientifically accepted and verified methods are in use. Measurements are used to calculate, using standard emission factors and mathematical models, the environmental impacts on a per single serving basis. The results are also converted to an indicator value by comparing with the US average for that product category. Where this is not appropriate other simple processes are used. For example, the indicator for acidification is based upon the Redfield ratio which is the optimal N/P ratio for phytoplankton growth. The Earthsure LCA information is printed on the product packaging, available on a product-specific website and/or in printed materials. This information includes the actual aggregated data, e.g. kg CO₂ eq for climate change; kg CFC-11 eq for stratospheric ozone depletion; H⁺ moles eq for acidification; kg N eq

Examples: P2. Limits of data aggregation

for eutrophication; kg NO_x eq for photochemical smog; m³-yrs for ecotoxicity; L water for water use; gm minerals for mineral resource; MJ eq for fossil fuel depletion; m² land occupied for land use/biodiversity; and gm soil for soil depletion.

Guideline P3: The financial cost of establishing, administering, managing and participating in the scheme needs to be equitable and commensurate with any potential benefits.

Benefits may be directly financial, such as a price premium, or they may be indirect or external, such as reduced negative environmental impacts or increases in environmental benefits. Therefore, if a scheme is costly to administer, then the potential benefits need to be greater. The ideal is high benefits with a low administration cost. There are many cost elements attached to labelling schemes relating to, for example:

- Staffing, facilities and management;
- Administration and membership management;
- Establishing and updating standards;
- Membership fees and data collection costs;
- Costs of auditing, inspection and verification;
- Promotion (advertising, branding, repackaging, graphics, printing, etc.) and consumer support.

Some costs are indirect and related to other practicalities such as administration time, inconvenience and bureaucracy. These are covered by Guideline P4.

Unless the scheme is subsidised in some way, all costs plus a profit margin will be passed to the membership. Therefore producers and industry must be able to clearly identify potential benefits and justify the financial outlay in terms of, for example, increased market share, price premiums, improved customer relations etc.

Research identified in the literature review (Bougherara and Combis, 2009; Golan et al., 2001; Melser and Robinson, 2005) suggests that the financial costs to industry may not be recoverable as most consumers do not sufficiently care where their food comes from or what the environmental implications of its production are or, where they do, the price premium demanded is not seen as justifiable. Some market-based evidence (Telsei et al., 2002) indicates that consumers can respond to eco-labels if they can relate to the scheme objectives but there is also strong evidence to show that any financial off-setting of the costs against market share or price premium is related to consumer confidence. When confidence is low (e.g. during a recession) then consumers may not be so willing to pay (Clearlyso, 2009; Beef Magazine, 2009; Carrigan and De Pelsmacker, 2009). In addition there are limits to the response that may be expected – not all consumers will respond, and those that do will have limits on how much extra they are willing to pay. Therefore the costs that must be met by producers and industry will ultimately govern what the scheme actually does, the impact categories covered and the metrics used (Guidelines O1, O2 and O3), i.e. if the costs of measuring, assessing, verifying and certifying all the significant impacts of a product exceed what can be recovered from a price premium or greater market share, then the scheme objectives need to be tailored or truncated based on to what costs can be absorbed within the current cost of production.

The analysis of environmental impacts identified how readily available data is for different impact areas within the production chain. This identified that in many instances data are based on emission factors or other estimates rather than measured data. This is because it is too costly to measure emissions. For example, it would be possible to measure and monitor methane emissions from each dairy cow but this would be vastly expensive (let alone impractical), and as such emission factors are used instead. Whilst this does affect the quality of data that might be used to underpin any label covering greenhouse gas emissions,

the use of emission factors provides a more feasible and affordable approach. The use of emission factors, in effect, links practices to outcomes using good empirical evidence, thus addressing the issue raised in Guideline M3 of connecting practices to outcomes. Therefore, Guidelines P1, P3 and P4 need to be considered in conjunction with each other, resulting in the use of techniques that are both the best available (scientifically) and cost-effective.

A key consideration here is that outcome-based metrics (Guideline M3) are usually costly to measure and assess but in order for them to be credible they need to be actually measured using robust techniques rather than being based on emission factors. Consequently, there is an inherent conflict between costs and credibility. However, over time, there may be scope to improve the methods and techniques that are available, including those that provide good empirical links between practices and outcomes (discussed above). In so doing, scheme compliance requirements can be refined and made more specific with respect to the activities and practices that need to be monitored and reported.

Examples: P3. Costs of participation

The practice-based schemes of SMK and LEAF Marque appear to be well established, financially sustainable and the costs of the scheme management and administration are met by producer/industry fees. In the case of LEAF Marque, membership of LEAF is required for LEAF Marque certification and ranges from £70 to £212 depending on farm size. Food chain companies (not farmers) require corporate membership ranging from £680 to £2350. Additionally, typical costs for LEAF Marque application/certification range from £150.00 to £500.00 (depending on farm size) and is payable to the certification body and LEAF take a royalty. However, there are little or no mechanisms for identifying environmental benefits arising from these schemes (see also Guidelines O3 and M3).

For Earthsure the situation is somewhat reversed, as financial sustainability is somewhat uncertain, but actual impacts are measured and assessed, so environmental improvements can be monitored over time. The Earthsure program was developed using general US program funds, without a specific sponsor. Development of new Product Category Rules is variously funded (usually by the first companies interested in adopting the label) and the program is maintained by fees for the use of the eco-label and from product premiums. Fees are developed on a case-by-case basis. Costs of engaging in the scheme range \$1000 to \$5000 per farm per year but this may not be charged as some/all funding may come from a small fee added to the cost of each labelled item sold. The scheme is not at present financially sound but that is, in part, is due to the newness of the programme. It is unclear (and somewhat doubtful) if the costs of participation are likely to be recouped from improved sales especially as Earthsure consider the science to be beyond most consumers. Currently, costs are established on a case by case basis. This might not be manageable or sustainable as the scheme grows. Government subsidies for the program are currently being negotiated.

Guideline P4: The burden on industry with respect to scheme application, administration, bureaucracy, verification and inspections needs to be equitable and commensurate with any potential benefits.

Guideline P4 is closely related to Guideline P3 but refers to indirect and hidden costs, and 'nuisance' issues associated with membership of such schemes. It is also strongly governed by the objectives and purpose of the scheme (Guideline O1), as this will define the potential benefits. It may be that the actual financial costs are bearable and the benefits understandable but these must not be outweighed by over complex or bureaucratic processes.

Issues raised by industry (taken from the literature review and the consultation exercise) include:

- Amount of paperwork required – this is often a duplication of that required for other schemes. Little data sharing occurs but it is recognised that there are confidentiality issues here;
- Scheduling of site visits and inspections – where a producer or organisation is a member of several schemes and initiatives many such site visits may be required all of which gather similar data. Any new labelling scheme needs to fit in well with existing schemes and initiatives;
- Collecting data may be time consuming or complex;
- Unfairness on small businesses;
- Lack of flexibility.

The scheme should be kept as simple as it needs to be in order to deliver its objectives but the amount of burden placed on producers and industry must be considered.

Examples: P4. Administrative burden

SMK and LEAF Marque are well established and appear to be financially sustainable. In the case of LEAF Marque, scheme standards are not overly demanding and scheme is well-managed. Site visits, verification and inspection are streamlined as LEAF Marque is used in conjunction with other food quality assurance schemes, thus minimising administrative burden.

In the case of Earthsure, as the requirements of industry are established on a case by case basis it could be assumed that if the burden on the organisation/producer were too high they would not be participating. However, currently some costs are being born from central scheme funding. This may not be sustainable.

3.5. Communication

Guideline C1: Communication should be tailored for different target audiences.

The consultation exercise clearly identified that changing consumer and industry behaviour require different approaches. For example, detailed information on environmental impacts is probably more suited for communication within the industry, such as the use Environmental Product declarations (EPDs) (IEC, 2008), whereas simpler labels may be more suitable for consumer communication. However, it also depends on the purpose of the label, as in some instances more detailed information may be required, for example by consumers with more pro-environmental attitudes (Defra, 2008) who are already well-informed about the environmental impacts of food. As such the approach to communication is governed both by the objectives and purpose of the scheme (Guideline O1) and the mechanisms by which the scheme has chosen to operate (Guideline M1).

Examples: C1. Different audiences

For SMK the target audience is the consumer in the first instance. The label is widely recognised and considered credible.

For Earthsure, in the first instance the target audience is other competitive businesses but as the objective is ultimately to improve market share consumer communication is also being addressed. EPDs are used for the technically and scientifically competent user. Full and very comprehensive information is available on the scheme website. Public information and supporting material is very strong.

For Indice Carbone the target audience is the consumer and clear information regarding the interpretation of the label information is provided on the label.

Guideline C2: Communication of impacts should be based on data that has been credibly and transparently aggregated.

A label is always going to be a simplified means of communicating something that is, in reality, far more complex. Therefore some degree of aggregation will be involved. However, highly aggregated information on environmental impacts can often be meaningless (Blanc et al., 2008; Booyesen, 2002; Salzman, 2003). Labels may range from a simple 'tick' or 'kite mark' (e.g. LEAF Marque, 2008) to indicate that certain standards have been achieved, or it may consist of list of emissions and impacts (e.g. Earthsure, 2009), but in either instance some data and information has been aggregated. Thus it is important to ensure that this aggregation has been done in a credible and transparent way, consistent with the limits of what is technically possible (Guideline P2).

Examples: C2. Credible and clear aggregation

For Earthsure there is full disclosure of measured data, data pre- and post aggregation and indicator values are provided and for Indice Carbone standard techniques for aggregating the various greenhouse gases are used.

This guideline does not directly apply to practice-based schemes, as there is no aggregation of environmental outcome data.

Guideline C3: Methods of communicating impacts on a label should be as simple as possible.

The term that applies here is 'fit for purpose'. There are many different ways in which impacts could be communicated on a label. For example, it could be a single label to reflect that the product has met a set of standards (process or outcome-based) or a label that reflects the relative impact in a range of impact categories (like a traffic light system). However, the approach taken should relate back to the purpose and objectives of the label (Guideline O1), i.e. the purpose of the label may dictate how it is communicated. For example, if the purpose is to raise awareness and educate, then more information may need to be provided on the label, beyond a simple kite mark, tick or stamp. In such instances it may be appropriate to provide detailed information. A comment from one of the participants in the consultation exercise, argued that it was flawed to assume that consumers need simplified information: "people who use labels already understand them and the others won't use them no matter how they are simplified". This statement recognises that consumers are not homogenous and different segments (Defra, 2008) will have different requirements with respect to how they use label information, which ties in with Guideline C1. This guideline does not dictate any particular design principles for a label, simply that the label should be designed to meet the purpose of the label.

Examples: C3. As simple as needed for purpose

The Earthsure label has data available in full numerical format. No attempt has been made to interpret values as good or bad. No graphical or special communication techniques have been employed. Considering that the end user in the first instance is considered to be other businesses the impacts are communicated in a manner that will be understood. However, Earthsure themselves acknowledge that the data are probably too complex for the consumer so it is relying on the label to speak for itself. This may delay or even prevent significant uptake of Earthsure labelled products by consumers.

Indice Carbone's product carbon index value is shown on a sliding scale showing what constitutes good and best impact allowing consumers to make judgements. However, this is only valuable where fair and scientifically robust product comparisons can be made.

Examples: C3. As simple as needed for purpose

In the case of both SMK and LEAF Marque, the label is a simple indication that certain practices have been met. This is in accordance with the scheme objectives, but it is unclear about what exactly the scheme covers (see also Guideline C4).

Guideline C4: The boundaries of what the label covers needs to be clearly communicated.

The boundaries of what the label covers need to be transparent and include:

- The impact areas it covers (Guideline O2). There are examples of carbon labels (that promote a single environmental impact i.e. reduction of greenhouse gases or carbon neutrality) that use this as a basis to claim their product has no environmental impact (implying multiple issues are being addressed). If the label only covers one impact area, this should be clear and not ambiguous.
- The system to which the impacts are related requires clear definition i.e. is it a particular brand (e.g. LEAF Marque), a full process life-cycle (production to consumption) or just a sub-process such as manufacturing or on-farm production. This may be governed by the purpose and objectives of the scheme (Guideline O1).
- The functional unit of any impacts needs to be clear (Lagerstedt et al, 2003; Martínez-Blanco et al., 2010; Smith Cooper, 2003), e.g. per unit weight purchased, per portion as sold, per area of production or per harvested weight. This may be governed by the purpose and objectives of the scheme (Guideline O1).
- In relation to Guideline M2, it is important that the labelling scheme complements other initiatives that are tackling the same issues, and to not lay claim to being the sole cause of any benefits.

Examples: C4. Clear boundaries of coverage

Earthsure uses a full life cycle assessment approach developing EPDs for all production processes, and this is clearly communicated. Indice Carbone promotional information clearly states that the quantity of greenhouse gases emitted are calculated for five key life cycle stages from raw material production to the consumers home.

For LEAF Marque, only on-farm activities are addressed and this information can be found in the scheme documentation. However, it is unclear if consumers are fully aware of exactly what the LEAF Marque label covers.

For SMK the boundaries are unclear unless the product category standard is sourced and understood.

4.0. Conclusions

The framework described here has been derived from a broad range of environmental and socio-economic evidence gathered in the literature review, analysis of environmental impacts and consultation exercise. This evidence is very diverse so distilling this into a common framework and set of guidelines has not been an easy task, especially as many aspects are interrelated, but it was nevertheless achieved. There is probably scope to improve the framework, but its test application on 4 schemes has proven that it is capable of being a useful tool for analysing labelling schemes.

The outcome-based schemes of Earthsure and Indice Carbone appear to be more aligned with the guidelines, however Earthsure has some issues regarding its cost of operation and Indice Carbone is a single issue scheme, although this is clearly stated in its objectives. Stichting Milieukeur and LEAF Marque are both more practical to implement and less costly. However, there are issues associated with clarity on what impacts they cover, and how this is communicated, and the lack of outcome-based metrics and targets makes monitoring of progress towards actually improving environmental impacts difficult.

The framework has clearly identified the differences between the outcome and practice based schemes and has to some extent looked more favourably on those that have a more outcome-based approach. The framework is endeavouring to highlight schemes that are practical, effective, robust and credible. Practice-based schemes do well in relation to practicality, but they do not perform so well with respect to effectiveness in terms of environmental outcomes delivered (as this is largely unknown) and consequently this raises doubt over credibility and robustness, although this can be improved to some extent through independent verification and administration. Therefore it seems that practice-based schemes would benefit from improvement on the ability demonstrate they are effectively delivering outcomes, and outcome-based schemes need to be made more practical and less costly, so that any outcomes delivered are commensurate with the cost of delivery.

References

- Bare, J.C. and Gloria, T.P. (2008) Environmental impact assessment taxonomy providing comprehensive coverage of midpoints, endpoints, damages, and areas of protection. *Journal of Cleaner Production*, **16**, 1021-1035.
- Bare, J.C., Hofstetter, P., Pennington, D. and Udo de Haes, H.A. (2000) Midpoints versus Endpoints: the sacrifices and benefits. *The International Journal of Life Cycle Assessment*, **5:6**, 319-326
- Blanc, I., Friot, D., Margni, M. and Jolliet, O. (2008) Towards a new index for environmental Sustainability based on a DALY weighting approach. *Sustainable Development*, **16**, 251-260
- Booyesen, F. (2002) An overview and evaluation of composite indices of development. *Social Indicators Research*, **59**, 115-151
- Bougherara, D. and Combris, P. (2009) Eco-labelled food products: what are consumers paying for? *European Review of Agricultural Economics*, **36(3)**, 321-341
- Carrigan, M. and De Pelsmacker, P. (2009) Will ethical consumers sustain their values in the global credit crunch? *International Marketing Review*, **26(6)**, 674-687
- Clearlyso (2009) *Sales of organic food slump by up to 30 percent*. Available at: <http://www.clearlyso.com/newsitem.jsf?id=194>
- Defra (2003) *Green Claims - Practical Guidance. How To Make A Good Environmental Claim*. Department for Environment, Food and Rural Affairs, PB9501c
- Defra (2008) *A framework for pro-environmental behaviours*. Department for Environment, Food and Rural Affairs, January 2008
- Earthsure (2009) *Earthsure™ Environmental Product Declarations Program*. Revision 1. Available at: http://earthsure.org/Earthsure_Program_EPDS.pdf
- Golan, E., Kuchler, F. and Mitchell, L. with contributions by Greene, C. and Jessup, A. (2001) Economics of Food Labelling, Economics of food labelling. *Journal of Consumer Policy*, **24**, 117-184
- IEC (2008) *Introduction, intended uses and key programme elements for Environmental Product Declarations, EPD*. International EPD Consortium (IEC). February 2008.
- Jolliet, O., Müller-Wenk, R., Bare, J., Brent, A., Goedkoop, M., Heijungs, R., Itsubo, N., Peña, C., Pennington, D., Potting, J., Rebitzer, G., Stewart, M., Udo de Haes, H. and Weidema, B. (2004) The LCIA Midpoint-damage Framework of the UNEP/SETAC Life Cycle Initiative. *The International Journal of Life Cycle Assessment*, **9:6**, 394-404
- Lagerstedt, J., Luttrupp, C. and Lindfors, L. G. (2003) Functional priorities in LCA and design for environment. *The International Journal of Life Cycle Assessment*, **8:3**, 160-166
- LEAF Marque (2008) *LEAF Marque Global Standard*. Version 8.0, issued 01/10/08. Effective from 1st January 2009. Linking Environment And Farming
- Martínez-Blanco, J., Antón, A., Rieradevall, J., Castellari, M. and Muñoz, P. (2010) Comparing nutritional value and yield as functional units in the environmental assessment of horticultural production with organic or mineral fertilization. The case of Mediterranean cauliflower production. *The International Journal of Life Cycle Assessment*, In press. DOI: 10.1007/s11367-010-0238-6
- Melser, D. and Robinson, P. E. (2005) Eco-labelling and the Trade-Environment Debate. *The World Economy*, **28(1)**, 49-62
- Pennington, D. W., Potting, J., Finnveden, G., Lindeijer, E., Jolliet, O., Rydberg, T. and Rebitzer, G. (2004) Life cycle assessment Part 2: Current impact assessment practice. *Environment International*, **30**, 721- 739
- Salzman, J. (2003) *Methodological choices encountered in the construction of composite indices of economics and social well-being*. Centre for the Study of Living Standards Report 2004-05, CSLS.
- SI 2008/2349 *The Nitrate Pollution Prevention Regulations 2008*
- SI 2009/3160 *The Nitrate Pollution Prevention (Amendment) Regulations 2009*
- Sleeswijk, A. W., van Oers, L. F.C.M., Guinée, J. B., Struijs, J. and Huijbregts, M. A. J. (2008) Normalisation in product life cycle assessment: An LCA of the global and European economic systems in the year 2000. *Science of The Total Environment*, **390:1**, 227-240

- Smith Cooper, J. (2003) Specifying functional units and reference flows for comparable alternatives. *The International Journal of Life Cycle Assessment*, **8:6**, 337-349
- Teisl, M. F., Roe, B. and Hicks, R. L. (2002) Can Eco-Labels Tune a Market? Evidence from Dolphin-Safe Labelling. *Journal of Environmental Economics and Management*, **43(3)**, 339-359
- UNEP (2003) *Evaluation of Environmental Impacts in Life Cycle Assessment*. United Nations Environment Programme. ISBN: 92-807-2144-5.
- van der Werf, H. M. G., Kanyarushoki, C., Corson, M. S. (2009) An operational method for the evaluation of resource use and environmental impacts of dairy farms by life cycle assessment. *Journal of Environmental Management*, **90(11)**, 3643-3652