Sustainability **2015**, *7*, 6086-6101; doi:10.3390/su7056086

OPEN ACCESS

sustainability

ISSN 2071-1050

www.mdpi.com/journal/sustainability

Article

First Catch Your Fish: Designing a "Low Energy Fish" Label

Andy Grinnall * and Simon Burnett

Aberdeen Business School, Robert Gordon University, Aberdeen AB10 7QE, UK;
E-Mail: s.burnett@rgu.ac.uk

* Author to whom correspondence should be addressed; E-Mail: a.p.grinnall1@rgu.ac.uk;
Tel.: +44-7920-080130.

Academic Editor: Seonaidh McDonald

Received: 2 April 2015 / Accepted: 13 May 2015 / Published: 18 May 2015

Abstract: This paper explores the application of information design principles to label design for fish packaging, identifying energy implications for the product. This stage of the project has consisted of: A review and distillation of the relevant literature on information and label design; environmental and labelling standards; and literature on consumer reaction to the design and information content of the label. Considering the design of a label requires the analysis and integration of a variety of factors while attempting to satisfy the demands of consumers and retailers.

Keywords: labelling; environmental standards; consumer behaviour; fish; energy

1. Introduction

This paper presents research conducted by members of staff at Robert Gordon University's Institute for Management, Governance and Society (IMaGeS) as part of the e-harbours project. E-harbours is a collaboration between industrial, academic and civic partners in cities and regions on the North Sea. The lead partner is the municipality of Zaanstad in the Netherlands, the other partners are: The municipality of Amsterdam in the Netherlands; the port of Antwerp in Belgium; the city of Malmö in Sweden; Hamburg University of Applied Science in Germany; Pure Energy Centre in Shetland, Scotland; Robert Gordon University in Aberdeen, Scotland; and Vision On Technology (VITO) in Belgium. The project has three high level objectives: To encourage greater use of renewable energy—wind, solar, wave and tidal, reuse of waste energy and products—in harbour cities; increase the use of energy smart grids by the use of flexible demand management to align supply and demand

of energy, intelligent storage and energy labelling; and increase the level of electric transport used in harbour regions [1].

The project was divided into several work packages. The aim of the work package relevant to this paper is to design a label for fish packaging (specifically haddock and mackerel) which presents the energy usage of the various stages of processing from catch to retail. This aim is achieved through the following objectives:

- To collect data from fishing boats and subsequent processing and transport activities, and to use that data in the production of an energy life cycle assessment (LCA).
- To generate energy information from the LCA to be included either on the label of the packaged fish, or as additional information available elsewhere, such as a website for example.
- To produce a selection of appropriate label designs.
- To test those designs with consumers.
- In consultation with producers and retailers, to recommend which type, form and content of label is most appropriate to achieving the above aim.

This paper focuses on the third objective: The production of the label designs. It brings together perspectives on information design; the specifics of label design; standards for environmental labels; and research into the way in which consumers read and understand information on labels, and how that information affects their behaviour.

2. Research Approach

A desk-based search and review of relevant literature in four areas—information design, label design, and consumer behaviour; and standards on environmental management and labelling—was conducted covering materials from a variety of disciplines such as economics, business and marketing, environmental studies, sociology, psychology, design, typography, food science, agriculture, energy, information studies, and political science. The review was conducted to combine the perspectives gleaned from the selected disciplines into proposed potential label designs.

2.1. Information Design Literature Review

While there is a relatively extensive and continuing literature of information design, there is some debate on whether the terminology is appropriate, with Raskin [2] (p. 343) suggesting that a more appropriate term would be "Designing Information Representation". Despite Raskin's suggestion, the concept of information design has been discussed by different writers, and as such the terminology is applied in this paper.

Definitions of information design vary widely, reflecting the viewpoints of their writers. In trying to elicit "the conceptual ground-zero for information design" Jacobsen [3] (p. xvi) provides his own definition:

> Its purpose is the systematic arrangement and use of communication carriers, channels, and tokens to increase the understanding of those participating in a specific conversation or discourse [4] (p. 3).

Jacobsen's definition neatly encapsulates the range of communication "devices" which must be considered in information design. In addition, he also recognises the need to increase the understanding of the information users. Other definitions of information research include the following:

- Information design is defined as the art and science of preparing information so that it can be used by human beings with efficiency and effectiveness [5] (p. 15).
- …the organization of information to achieve preconceived goals [6] (p. 224).
- The discipline addresses the organization and presentation of data and its transformation into meaningful information [7] (p. 268).

While useful, these definitions lack the theoretical considerations of Jacobsen's [4]. Other definitions considered include those presented by Redish [8] and Sless [9], however for the purposes of this research, the following definition by Petterson is adopted and applied:

> Information design comprises analysis, planning, presentation and understanding of a message—its content, language and form. Regardless of the selected medium, well designed information set, with its message, will satisfy aesthetic, economic, ergonomic, as well as receiver and subject matter requirements [10].

Eight "visual variables" that define the scope of a planar graphic system are described by Bertins [11] (p. 42), the two planar dimensions (*i.e.*, x and y axes) and six properties of the "marks" that constitute the elements on the plane: Size, value, texture, colour, orientation, and shape. Pettersson [10] considers the processes comprising information design, issues affecting the information itself, and importantly considers criteria for the effectiveness of the information from both user and content perspectives. In the specific context of this research the relevant areas of information design include the use of shapes, images, colours and text to convey information within the limitations set by the available size of the label, which in turn is constrained by the dimensions of the product packaging. Indeed these elements are all discussed by Petterson [12]. Basic shapes—circle, square and equilateral triangle—indicate visual direction, while less regular shapes draw the attention of the viewer. Various factors affect the choice of image: Graphical elements; size in relation to nearby objects; texture such as hard or soft edges; and the balance and organisation of objects within the overall image. Colours have a range of facets to consider, such as the influence of saturation on perception and the use of warm or cool colours, with the keys to deciding on colour use being simplicity and clarity. Suitability of text also depends on a number of aspects: Sans serif is preferred within pictures; bold or italic may be used for emphasis; and "we can conclude that size of type should be "large enough" [12] (p. 173).

Similar observations are made by Lipton [13]. Sans serif text is preferred when reading conditions are sub-optimal, as is likely to be the case on a small label. Colours may be used to aid recall, provide emphasis and convey meaning. Consistent design through the use of style sheets is recommended, particularly for recurring elements and by the use of a grid to ensure readers do not have to search for information. A particular point is made regarding testing of the design, which should be: Done early (changes are easier and cheaper than if done closer to the final version); done often, even with only a few people; and retest after making changes.

Tufte [14] (1990) describes a range of ways in which information may be presented to meet varying requirements, such as the use of colour, layers, and dimensions beyond those of the flat page and

screen. For example, a Swiss mountain map is enhanced by the use of colour in four ways: Labelling to discriminate between different types of feature; measuring altitude through contour lines; mimics the real world by the use of blue for water; and enlivens the reader's experience in ways that monochrome cannot [14] (p. 81).

The importance of the relationship between images and text is explored by Marsh and White [15]. They demonstrate that there are three categories into which functions of the image in relation to the text may fall: Little relationship between the two; a close relationship; and those where the image enhances the degree of understanding provided by the text alone.

An analysis of issues relating to the interaction of people and information notes, among others, "the complexity of information available to consumers and professionals" and "the still nascent development of dynamic interaction between the user and information" [16] (pp. 73–74). Subsequent hardware and software developments have led to one way in which this dynamic interaction can be achieved: Through the use of Quick Response (QR) codes [17] to allow users to readily access additional product information via mobile devices.

2.2. Label Design Literature Review

The label being designed is considered to be an environmental or eco-label, defined by Boström [18] (p. 346) as "eco-labels are markers which are presented to a consumer or a professional buyer, and which symbolize environmentally beneficial consumer choices (compared to its options)". Much of the label design literature refers to labels where legal compliance is required, in particular medicines and food nutrition. However as the literature specifically about the design of eco-labels is limited, design considerations have been supplemented by reports of research conducted in other areas.

Guidelines for the use of labels in communicating environmental information have been proposed by Lewis *et al.* [19]: Different approaches depending on the target audience; impacts based on data gathered credibly and transparently; impacts are communicated simply; and the boundaries covered by the label are made clear. These are reinforced by the findings [20] that consumers want a carbon label to be simple to understand, give context, be noticeable, come from a trusted voice, and to complement other sustainability labels.

Simplicity may be viewed as a key area of eco-label design. Héroux *et al.* [21] (1988) determine that generally consumers recall between three and five label items, depending on the time available to view the label and the age of the consumer. For nutrition labels the optimum design may be a simple front of pack label supplemented by a back of pack label providing additional information [22,23]. Teisl *et al.* [24] found that the provision of additional quantitative information may lead to a decrease in consumer interest as they make a negative choice compared to having no information previously. Too much, or too complex, information may lead to failure by consumers to use labels to make purchasing decisions [25,26]. However, in a comparison of Dutch eco-labels, Van Amstel *et al.* [27] (p. 274) concluded that "eco-labels do not provide enough information to diminish the information gap" due to their partial failure to ensure that the information they contain is reliable. Comprehension may also be an issue, with Gadema and Oglethorpe [28] reporting that 89% of their sample believed the information provided to be confusing. A further consideration [29] is that while consumers like to

have information presented simply, they are wary of having information interpreted for them, and do not like to feel they are being coerced into making a particular choice.

In relation to museum exhibits, three areas guide label designs [30]. Firstly, know the audience: Their cognitive limits; the perceived time and effort involved in understanding a label *versus* the benefits they get from it; and ensuring they are not overloaded with information. Secondly capture the attention of the audience, through label placement, length of text and letter size, and density of visual stimuli. Finally, audience attention has to be held, using clear language, legibility, and the physical organization of the label. An additional factor is shown by Braun *et al.* [31], who found that colour labels were more effective than monochrome when studying hazard perception. A similar result was obtained by Balcombe *et al.* [32], where the message of a traffic light labelling system was enhance by the colour choices made.

Upham and Bleda [33] found that the quantitative data on a carbon label was of less importance than the symbolic value of the label itself. Similarly Boström and Klintman [34] note that symbolic differentiation is a key element of green labelling, in that the label acts as a symbol to say that there is something different about this product compared to others. Upham *et al.* [35] conclude that in order to transition to a low carbon economy there must be a wide application of carbon labelling, and that the label must indicate reduction rather than simply listing emission data. Röös and Tjärnemo [36] draw a similar conclusion.

2.3. Consumer Behaviour Literature Review

Eco-labels can serve multiple purposes, some of which are: Delivering information on quality [25,37,38]; encouraging sustainability [39]; and influencing production and consumption systems [40]. Two market segments for green products were found by D'Souza *et al.* [41]: Those who use the label to determine whether the product meets their quality requirements, and the other who are prepared to pay a price premium for environmentally labelled products.

By itself the label may not be enough to convince consumers to make a purchase; the relationship with the product's price is also an issue. Gadema and Oglethorpe [28] describe how price sensitivity is a key component in the decision to purchase a lower carbon product, while Vanclay *et al.* [42] found that coincidence of price and a "good" carbon label provokes a strong purchase response in consumers. Grankvist and Biel [43] describe how consumers rate all aspects (such as health and taste), with the exception of price, more highly for eco-labelled products. According to Bougherara and Combris [44] purchasing higher-priced fish because it is eco-labelled rather than due to considerations of taste or safety is evidence of altruism in consumers. However, the actual degree to which environmental labelling influences consumer purchasing decisions may be overstated by those consumers [45].

An indication of interest in fish welfare and sustainability [46] is not necessarily reflected in the frequency of consumption, with wild-caught fish being more likely to be rejected for these reasons than farmed fish, where quality is the greatest concern. Kole *et al.* [47] in fact found that providing information about farmed fish had a negative effect on purchasing intent, possibly because it caused the consumer to emphasise pre-existing concerns. A correlation between demand for eco-labelling of fish and other factors such as fresh *versus* frozen and wild *versus* farmed was identified by Brécard *et al.* [48].

Grunert and Wills [29] conclude that consumers are only impacted by labels to which they are exposed, and that the impact is greater if they have searched for the information themselves. An argument is advanced by Rex and Baumann [49] that most eco-labels are positive, but that additional consumers may be influenced by the greater use of negative labelling. Borin *et al.* [50] consider that favourable perceptions of green products would be enhanced if there was a requirement for non-green products to be labelled with their harmful ingredients.

Berry *et al.* [20] (pp. 9–12) describe five different types of label: Stamp of approval, absolute numbers, traffic lights, Guideline Daily Amount (GDA) and sliding scale. Their study of consumer reaction to these label designs recorded a variety of views, with some people preferring a very simple label without any numbers because there was no comprehension of what those numbers mean, while others preferred to have the numbers in order to understand where a product fits in a scale with other products. The study made four recommendations:

- Give consumers options, not just information. Make sure that communication isn't just for communication's sake: Make sure that it is designed to change consumer behaviour.
- Do put climate change impacts of products into context. But the product or category you compare to is critical—Don't necessarily compare apples with apples.
- Be selective and limit information to what is really needed, so that the message does get "noticed".
- Tackle the 'how does it fit with other sustainability labels' question.

Product formulation may be influenced by labelling: "All that is required is that a population segment of its consumer advocates read labels and use or publicize what they find" [51] (p. 463). Dendler [40] suggests that labelling schemes can influence production and consumption systems even though "they appear to be 'better than nothing' solutions" in the journey towards more radical solutions requiring political and societal action. Substantial state involvement was found by Sonderskov and Daughbjerg [52] to enhance consumer confidence in organic labelling, while Onozaka and Thilmany McFadden [53] demonstrate how local labelling of products may enhance the effectiveness of complementary labels such as organic and Fairtrade.

2.4. Environmental and Labelling Standards

With a few exceptions (such as the compulsory use of the EU Organic label [54] on pre-packaged products produced in the EU and sold as organic) environmental labels on food products are displayed voluntarily, both by producers, to demonstrate the environmental credentials of their products, and by retailers to provide visible evidence to differentiate them from other retailers. An example of the retailer use of voluntary labels is The Co-operative Food's commitment to Fairtrade products [55]. However, many labels are produced in accordance with published standards in order to establish their credibility with producers, retailers and consumers. The key standards are those created by the International Organisation for Standardization (ISO) in the ISO 14020 series, Environmental labels and declarations. These are often incorporated directly into national standards, for instance in the UK they are documented by the British Standards Institute [56]. The ISO 14020 series contains three individual standards for particular types of environmental labelling.

2.4.1. ISO 14024:1999 Type I Environmental Labelling

The Type I environmental labelling programme is a voluntary, multiple-criteria-based third party programme that awards a licence authorising the use of labels on products indicating the overall environmental preferability of that product within the product category based on life cycle consideration. The licence is issued by an ecolabelling body granting the right to use Type I environmental labels for its products or services in accordance with the rules of the programme.

2.4.2. ISO 14021:1999+A1:2011 Self-Declared Environmental Claims (Type II Environmental Labelling)

This standard defines the requirements to be achieved in order for an environmental claim to be made by someone who may benefit from that claim, without independent third-party certification. The standard lists six anticipated potential benefits of self-declared claims, of which three have particular relevance in this case:

- Accurate and verifiable claims that are not misleading.
- An increase in the potential for market forces to stimulate environmental improvements.
- Increased opportunity for more informed choices to be made.

2.4.3. ISO 14025:2006 Type III Environmental Declarations

This establishes the principles and specifies procedures for developing Type III environmental declarations and programmes, specifically establishing the use of ISO 14040 series standards. It is intended primarily for business to business transactions, but use in business to consumer transactions is not precluded. A Type III environmental declaration is one providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information. The parameters are based on ISO 14040 series standards, in particular 14040 and 14044. Objectives of Type III environmental declarations are:

- To provide LCA-based information and additional information on the environmental aspects of products.
- To assist purchasers and users to make informed comparisons between products; these declarations are not comparative assertions.
- To encourage improvement of environmental performance.
- To provide information for assessing the environmental impacts of products over their life cycle.

2.4.4. Social Responsibility Labels

A type of label commonly found that is not covered by the ISO standards is the social responsibility label [57]. These tend to address issues that are not covered by other environmental labels, such as workers' rights, child labour, and making fair payments to producers. Despite this, they will have defined a set of criteria that applicants for the label have to meet in order to be able to use it. An example is the Fairtrade Mark, indicating that products meet standards to ensure farmers and workers

in developing countries receive a fair and stable price as well as the Fairtrade premium which they decide how to invest in their businesses and communities [58].

3. Results and Discussion

As stated previously Berry *et al.* [20] suggest five different types of label. For a fish energy label the GDA option is not appropriate, as there is no acceptable daily usage value on which to base the label. The other label types all offer possible solutions in this case; draft design options are presented here, with haddock used as the exemplar where species identification is appropriate. These designs are intended for on-packet use with packaged fish products, which may include whole fish, fillets, steaks and other items. The designs offered here are prototypes showing what might be possible; further refinement would be considered to take into account issues with label size, colours, shapes, fish drawing and typefaces. Consultation with design experts, producers and retailers, along with consumer testing, would be required in order to arrive at final designs.

3.1. Stamp of Approval

Essentially this gives the consumer a single piece of information, for instance (in our case), that this is a low energy product. Examples include the Fairtrade label [58], the EU Ecolabel "leaf" [59], and sustainable harvesting labels such as the Forest Stewardship Council [60].

This type of label (Figure 1) offers a number of advantages: Simple to produce and apply; easy for consumers to identify that the product is low energy; provides a point of differentiation with non-labelled products; the label size can be relatively small and will not take up too much valuable packaging space. There are two key disadvantages: No specific energy information is provided; and there is no way for the consumer to determine what is meant by low energy.

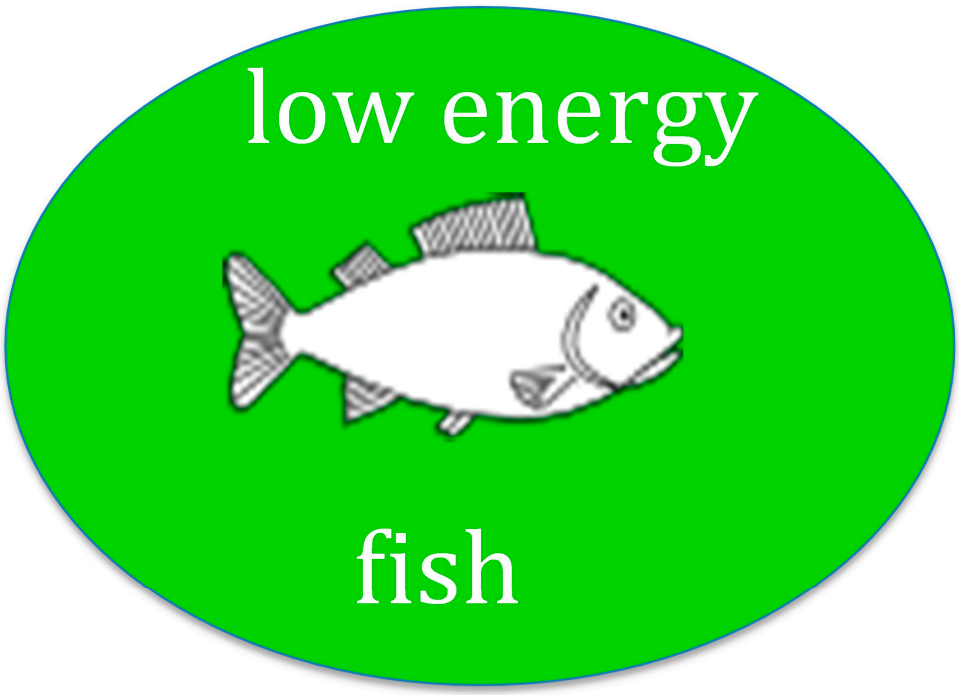

Figure 1. Stamp of approval label.

3.2. Absolute Numbers

This type of label is often based on a stamp of approval design but with the addition of a specific piece or pieces of data to support the proposition, although other designs are also possible. The example shown in Figure 2 includes both a figure for the energy usage of a standard weight of fish, and the actual energy used for the particular weight of packaged product.

Advantages, some of which are improvements on the basic stamp of approval design, are that consumers can readily compare similarly labelled products; the data provided are relatively simple; and label size can be compact (although this may depend on the amount of information shown). There are, however, a number of disadvantages: Numbers are not meaningful unless there is a context in which they can be understood; consumers cannot readily determine from the numbers whether a product is good or bad, although this can be mitigated by association with a stamp of approval design; and it is more complex to produce, particularly if the data for a specific pack are used, requiring labels to be individually printed rather than produced en masse.

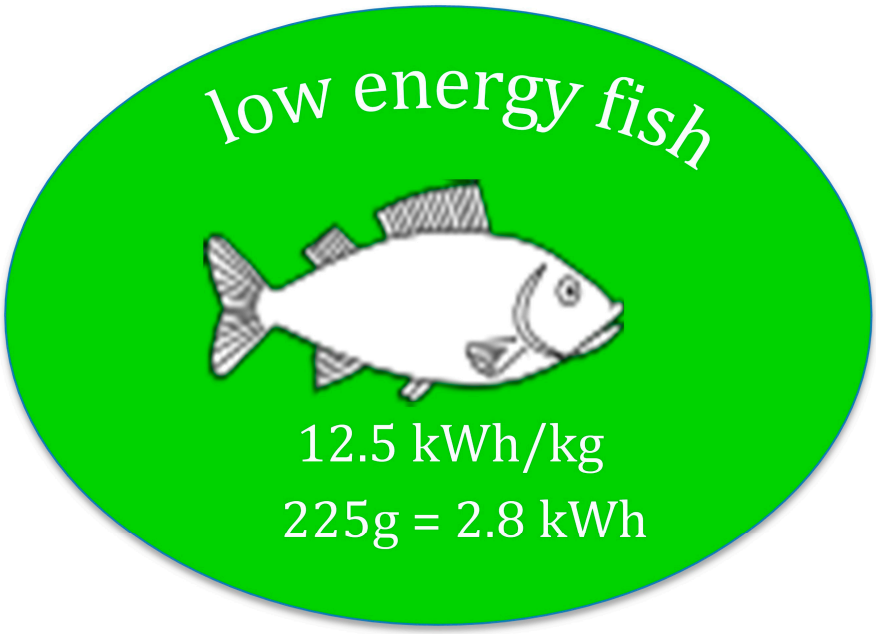

Figure 2. Absolute numbers label.

3.3. Traffic Lights

This was found to be the most popular option in consumer testing of carbon [20], at least partially because of familiarity through its use in nutrition labelling. The concept of traffic light labels is that a product may be rated green (best or low energy in our case), amber (medium), or red (worst–high energy). The label may function as an equivalent to either a stamp of approval (Figure 3) or absolute numbers (Figure 4) design. Consequently similar advantages and disadvantages apply; however there is one additional advantage and disadvantage. These are respectively: The traffic light format instantly enables the consumer to see how the product rates compared to other products, without even the need to read accompanying text; and that the label almost certainly needs to be larger than either a stamp of approval or absolute numbers label, which may be an issue if there is limited space on the product packaging.

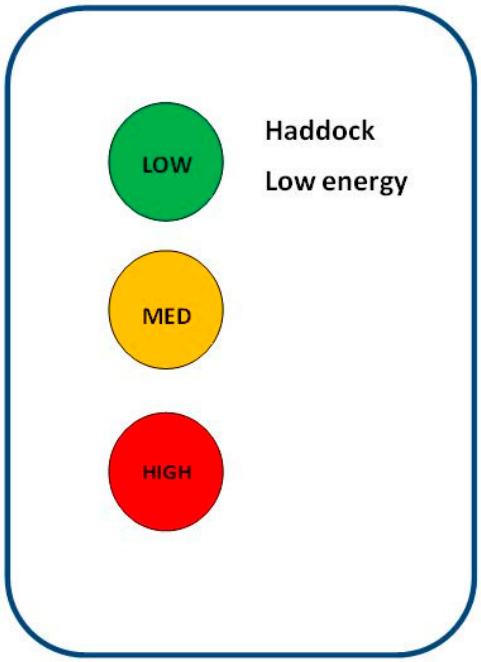

Figure 3. Traffic light label (stamp of approval).

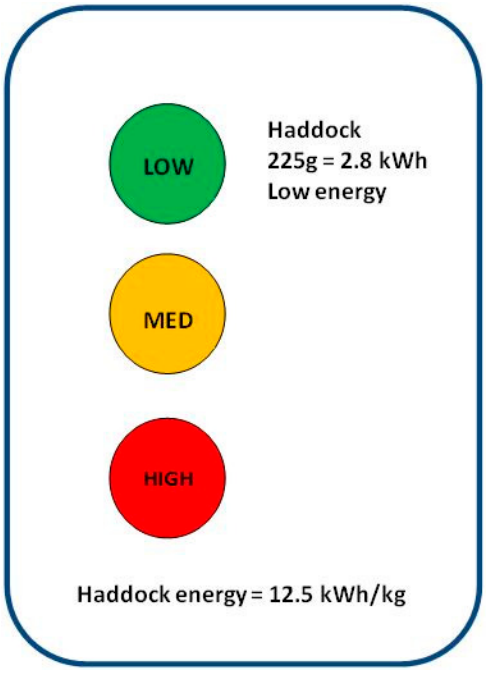

Figure 4. Traffic light label (absolute numbers).

3.4. Sliding Scale

Consumers are well aware of this type of label for its mandatory use within the EU for products such as domestic electrical appliances [61]. The design generally uses coloured horizontal bar charts with a seven point scale, typically with A as the most efficient and G the least, although improvements in the efficiency of domestic appliances has led to the expansion of the A grade to include A+, A++ and A+++; where these new designations are used the upper end of the scale is reduced to retain the seven points.

Many labels of this type are compulsory as a result of EU legislation (and similar legislation in other parts of the world), and the design of the label is fixed. As the fish energy label is voluntary there are no mandatory design rules to follow, but it seems reasonable to utilise the basic principles embodied in the existing designs.

This design (Figure 5) has a number of advantages: Information is provided in both graphical and numeric formats, embracing a wider range of comprehension levels; consumers are familiar with the concepts employed by the sliding scale; and comparison between products using the label is easy. However, there are more disadvantages to this type of label than the other types: The larger size is likely to be an issue on smaller packages; time is required for all of the information shown to be evaluated; analysis of the energy used in a wide range of product sources is necessary to determine the upper and lower limits of the scale; if the label is not compulsory or is only used on the most efficiently-produced items it becomes less effective in influencing consumer behaviour; and the cost associated with analysing the data required then creating the label may add to the product cost.

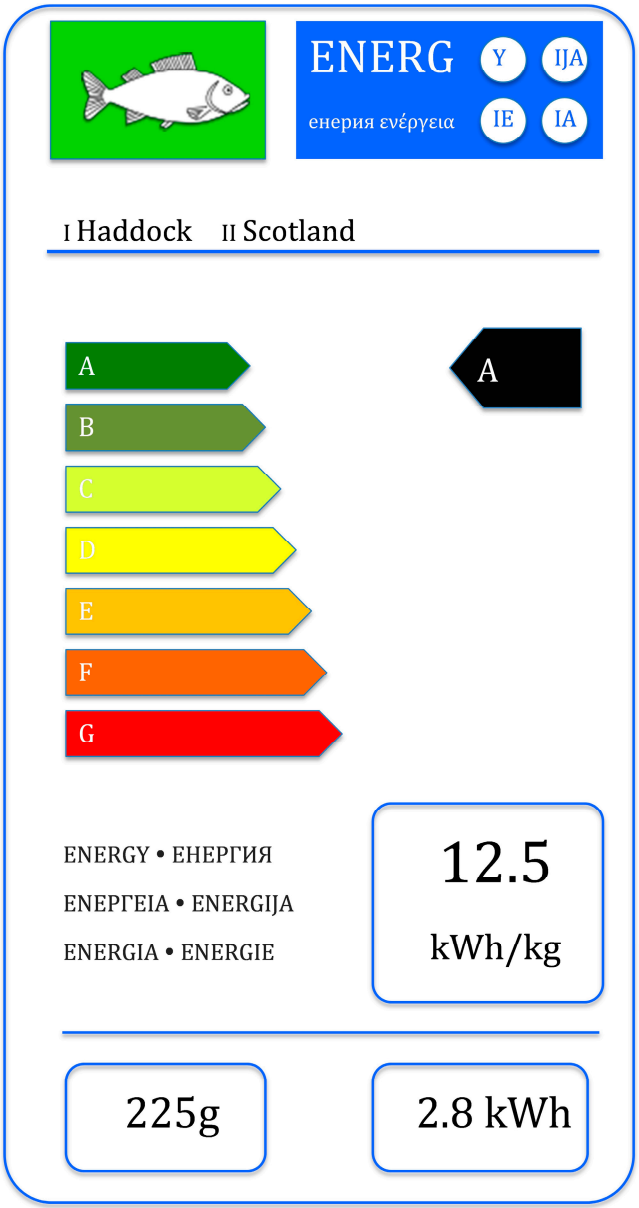

Figure 5. Sliding scale label.

3.5. Supporting Information

While the label designs illustrated here may equip the consumer to make an informed purchase decision, they are unlikely to provide enough information for anyone who desires to understand more deeply what the label really means. To achieve that requires more information to be made available than can readily fit on a front-of-package label. Examples may include the method used to calculate the energy data, comparisons with similar and alternative products, and the energy data itself if a stamp of approval design is used. However, labels may include details of additional or supplementary information sources.

It is likely that the main source of supporting information will be on a website, which the consumer can be directed to. A number of options are possible for the location of this direction: A back-of-package label; information leaflets; point of sale display; and product advertising. Any of these may include a limited amount of additional information along with details of a website on which more in-depth information may be found. Methods for directing the reader to the website may include a URL or a QR Code. The level of supporting information required and the preferred options for obtaining that information will be further explored during consumer testing of the labels in the next phase of the project.

4. Conclusions

At this stage in the project it is difficult to draw firm conclusions as to which label design will best accomplish the aims of the relevant work package. However, much has been learned from the process so far. It is clear that there are a vast range of factors that should be taken into account. From the information design perspective we have colour, shape, typography, text placement, and graphical elements, among many others. Specifically relating to label design we have to consider readability, the volume of information included, label size and placement on the product, and the process by which the label's data has been gathered. Decisions need to be made whether to comply with international or other standards, or to design outside the constraints of the standards. In addition we need to consider which aspect or aspects of consumer behaviour we wish to influence.

Taken together, these and other factors would require a potentially vast number of different designs to be created in order to cover all combinations. Clearly this is not practical, so a pragmatic decision has to be taken on a reasonable number of options to be progressed to the next phase of the project. Naturally, the selection does not preclude a return to the design phase should testing with producers, retailers and consumers reveal that alternatives may prove more successful.

While the decline of fish stocks in the Northeast Atlantic have been reversed to some extent in the last 10 years [62] there is still a need to make significant efforts to ensure that fishing is undertaken sustainably, and a label of this type is one of the ways in which sustainable behaviour can be encouraged.

We end with the words of Porritt and Goodman [39] (p. 56), describing the future for fish labelling in supermarkets: "…we do need enough information to make a decision about whether the product comes from a sustainable source or not. If the infrastructure to provide this kind of information isn't in place, then developing it must be a priority".

Acknowledgments

The e-harbours project (http://eharbours.eu/) is supported by the European Union Interreg IVB North Sea Region Programme—35-2-16-10.

Author Contributions

Simon Burnett directed the research. Andy Grinnall undertook the desk based research and created the label designs. The first draft of this article was written by Andy Grinnall and subsequently revised by Simon Burnett and Andy Grinnall.

Conflicts of Interest

The authors declare no conflict of interest.

References

1. The Objectives of E-Harbours. Available online: http://eharbours.eu/about (accessed on 6 December 2012).
2. Raskin, J. Rationalizing information representation. In *Information Design*; Jacobsen, R., Ed.; MIT Press: Cambridge, MA, USA, 1999; pp. 341–348.
3. Jacobsen, R. Preface. In *Information Design*; Jacobsen, R., Ed.; MIT Press: Cambridge, MA, USA, 1999; pp. xv-xvi.
4. Jacobsen, R. Introduction: Why information design matters. In *Information Design*; Jacobsen, R., Ed.; MIT Press: Cambridge, MA, USA, 1999; pp. 1–10.
5. Horne, R. Information design: The emergence of a new profession. In *Information Design*; Jacobsen, R., Ed.; MIT Press: Cambridge, MA, USA, 1999; pp. 15–34.
6. Thwaites, H. Visual design in three dimensions. In *Information Design*; Jacobsen, R., Ed.; MIT Press: Cambridge, MA, USA, 1999; pp. 221–246.
7. Shedroff, N. Information interaction design: A unified field theory of design. In *Information Design*; Jacobsen, R., Ed.; MIT Press: Cambridge, MA, USA, 1999; pp. 267–292.
8. Redish, J.C. What is information design? *Tech. Commun.* **2000**, *47*, 163–166.
9. Sless, D. Measuring information design. *Inf. Des. J.* **2008**, *16*, 250–258.
10. Basic ID-concepts. Available online: http://www.iiid.net/PDFs/Basic%20ID-concepts.pdf (accessed on 10 December 2012).
11. Bertins, J. *Semiology of Graphics: Diagrams Networks Maps*; University of Wisconsin Press: Madison, WI, USA, 1983.
12. Petterson, R. *Information Design: An Introduction*; John Benjamins: Amsterdam, The Netherlands, 2002.
13. Lipton, R. *The Practical Guide to Information Design*; John Wiley: Hoboken, NJ, USA, 2007.
14. Tufte, E.R. *Envisioning Information*; Graphics Press: Cheshire, CT, USA, 1990.
15. Marsh, E.E.; White, M.D. A taxonomy of relationships between images and text. *J. Doc.* **2003**, *59*, 647–672.

16. Leonidas, G. Information design: The missing link in information management? *Int. J. Inf. Manag.* **2000**, *20*, 73–76.
17. About QRcode.com. Available online: http://www.qrcode.com/en/index.html (accessed on 10 December 2012).
18. Boström, M. Regulatory credibility and authority through inclusiveness: Standardization organizations in cases of eco-labelling. *Organization* **2006**, *13*, 345–367.
19. Development of a Framework for Practical and Effective Eco-Labelling of Food Products. Available online: http://randd.defra.gov.uk/Document.aspx?Document=FO0419_10000_FRA.pdf (accessed on 5 March 2013).
20. Berry, T.; Crossley, D.; Jewell, J. *Check-out Carbon: The Role of Carbon Labelling in Delivering a Low-Carbon Shopping Basket*; Forum for the Future: London, UK, 2008.
21. Héroux, L.; Laroche, M.; McGown, K.L. Consumer product label information processing: An experiment involving time pressure and distraction. *J. Econ. Psychol.* **1988**, *9*, 195–214.
22. Fuenekes, G.I.J.; Gortemaker, I.A.; Willems, A.A.; Lion, R.; van den Kommer, M. Front-of-pack nutrition labelling: Testing effectiveness of different nutrition labelling formats front-of-pack in four European countries. *Appetite* **2008**, *50*, 57–70.
23. Kimura, A.; Wada, Y.; Kamada, A.; Masuda, T.; Okamoto, M.; Goto, S.; Tsuzuki, D.; Cai, D.; Oka, T.; Dan, I. Interactive effects of carbon footprint information and its accessibility on value and subjective qualities of food products. *Appetite* **2010**, *55*, 271–278
24. Teisl, M.; Rubin, J.; Noblet, C.L. Non-dirty dancing? Interactions between eco-labels and consumers. *J. Econ. Psychol.* **2008**, *29*, 140–159.
25. Dimara, E.; Skuras, D. Consumer demand for informative labeling of quality food and drink products: A European Union case study. *J. Consum. Market.* **2005**, *22*, 90–100.
26. Pieniak, Z.; Kolodziejczyk, M.; Kowrygo, M.; Verbeke, W. Consumption patterns and labelling of fish and fishery products in Poland after the EU accession. *Food Control* **2011**, *22*, 843–850.
27. Van Amstel, M.; Driessen, P.; Glasbergen, P. Eco-labeling and information asymmetry: A comparison of five eco-labels in the Netherlands. *J. Clean. Product.* **2008**, *16*, 263–276.
28. Gadema, Z.; Oglethorpe, D. The use and usefulness of carbon labelling food: A policy perspective from a survey of UK supermarket shoppers. *Food Policy* **2011**, *36*, 815–822.
29. Grunert, K.G.; Wills, J.M. A review of European research on consumer response to nutrition information on food labels. *J. Public Health* **2007**, *15*, 385–399.
30. Bitgood, S. The ABCs of label design. In *Visitor Studies: Theory, Research, and Practice, Volume 3*; Bitgood, S., Benefield, A., Patterson, D., Eds.; Center for Social Design: Jacksonville, AL, USA, 1990.
31. Braun, C.C.; Kline, P.B.; Silver, N.C. The influence of color on warning label perceptions. *Int. J. Ind. Ergon.* **1995**, *15*, 179–187.
32. Balcombe, K.; Fraser, I.; Di Falco, S. Traffic lights and food choice: A choice experiment examining the relationship between nutritional food labels and price. *Food Policy* **2010**, *35*, 211–220.
33. Carbon Labelling: Public Perceptions of the Debate. Available online: http://www.sci.manchester.ac.uk/uploads/carbonlabellingpublicperceptionsofthedebate.pdf (accessed on 7 March 2013).

34. Boström, M.; Klintman, M. *Eco-Standards, Product Labelling and Green Consumerism*; Palgrave Macmillan: Basingstoke, UK, 2008.
35. Upham, P.; Dendler, L.; Bleda, M. Carbon labeling of grocery products: Public perceptions and potential emissions reductions. *J. Clean. Product.* **2011**, *19*, 348–355
36. Röös, E.; Tjärnemo, H. Challenges of carbon labeling of food products: A consumer research perspective. *Br. Food J.* **2011**, *113*, 982–996.
37. Pieniak, Z.; Verbeke, W.; Vermeir, I.; Brunsø, K.; Olsen, S.O. Consumer interest in fish information and labeling: Exploratory insights. *J. Int. Food Agribus. Market.* **2007**, *19*, 117–141.
38. Caswell, J.A.; Mojduszka, E.M. Using informational labeling to influence the market for quality in food products. *Am. J. Agric. Econ.* **1996**, *78*, 1248–1253.
39. Porritt, J.; Goodman, J. *Fishing for Good*; Forum for the Future: London, UK, 2005.
40. Dendler, L. The role of product labelling schemes in shaping more sustainable production and consumption systems. In *Social Dimensions of Environmental Change and Governance*, Proceedings of the 10th Conference on the Human Dimensions of Global Environmental Change, Berlin, Germany, 8–9 October 2010; Freie Universität: Berlin, Germany, 2010.
41. D'Souza, C.; Taghian, M.; Lamb, P. An empirical study on the influence of environmental labels on consumers. *Corp. Commun.: Int. J.* **2006**, *11*, 162–173.
42. Vanclay, J.K.; Shortiss, J.; Aulsebrook, S.; Gillespie, A.M.; Howell, B.C.; Johanni, R.; Adams, R.A.; Maher, M.J.; Mitchell, K.M.; Stewart, M.D.; *et al*. Customer response to carbon labeling of groceries. *J. Consum. Policy* **2011**, *34*, 153–160.
43. Grankvist, G.; Biel, A. The importance of beliefs and purchase criteria in the choice of eco-labeled foods. *J. Environ. Psychol.* **2001**, *21*, 405–410.
44. Bougherara, D.; Combris, P. Eco-labelled food products: What are consumers paying for? *Eur. Rev. Agric. Econ.* **2009**, *36*, 321–341.
45. Leire, C.; Thidell, Å. Product-related environmental information to guide consumer purchases—A review and analysis of research on perceptions, understanding and use among Nordic consumers. *J. Clean. Product.* **2005**, *13*, 1061–1070.
46. Verbeke, W.; Vanhonacker, F.; Sioen, I.; Van Camp, J.; de Henauw, S. Perceived importance of sustainability and ethics related to fish: A consumer behavior perspective. *AMBIO: J. Human Environ.* **2007**, *36*, 580–585.
47. Kole, A.P.W.; Altintzoglou, T.; Schelvis-Smit, R.A.A.M.; Luten, J.B. The effect of different types of product information on the consumer product evaluation for fresh cod in real life settings. *Food Qual. Prefer.* **2009**, *20*, 187–194.
48. Brécard, D.; Hlaimi, B.; Lucas, S.; Perraudeau, Y.; Salladarré, F. Determinants of demand for green products: An application to eco-label demand for fish in Europe. *Ecol. Econ.* **2009**, *69*, 115–125.
49. Rex, E.; Baumann, H. Beyond ecolabels: What green marketing can learn from conventional marketing. *J. Clean. Product.* **2007**, *15*, 567–576.
50. Borin, N.; Cerf, D.C.; Krishnan, R. Consumer effects of environmental impact in product labelling. *J. Consum. Market.* **2011**, *28*, 76–86.
51. Caswell, J.A.; Padberg, D.I. Toward a more comprehensive theory of food labels. *Am. J. Agric. Econ.* **1992**, *74*, 460–468.

52. Sonderskøv, K.M.; Daugbjerg, C. The state and consumer confidence in eco-labeling: Organic labeling in Denmark, Sweden, The United Kingdom and The United States. *Agric. Human Value* **2011**, *28*, 507–517.
53. Onozaka, Y.; Thilmany McFadden, D. Does local labeling complement or compete with other sustainable labels? A conjoint analysis of direct and joint values for fresh produce claim. *Am. J. Agric. Econ.* **2011**, *93,* 689–702.
54. EU Organic Logo. Available online: http://ec.europa.eu/news/agriculture/120704_en.htm (accessed on 29 January 2013).
55. Fairtrade—We Are Committed to Making a World of Difference. Available online: http://www.co-operativefood.co.uk/ethics/Ethical-trading/Fairtrade-2013/ (accessed on 8 March 2013).
56. British Standards Institution. *BIP3073:2006 Environment Labelling and Lifecycle Assessment CD-ROM.* [CD-ROM]; British Standards Institution: London, UK, 2006.
57. Labeling: 2degrees Sustainability Essentials. Available online: http://www.2degreesnetwork.com/groups/supply-chain/resources/2degrees-essentials-guide-labeling/ (accessed on 29 January 2013).
58. The FAIRTRADE Mark. Available online: http://www.fairtrade.org.uk/what_is_fairtrade/fairtrade_certification_and_the_fairtrade_mark/the_fairtrade_mark.aspx (accessed on 29 January 2013).
59. The EU Ecolabel. Available online: http://ec.europa.eu/environment/ecolabel/index_en.htm (accessed on 31 January 2013).
60. Importance of Forest Stewardship. Available online: http://ic.fsc.org/importance-of-forest-stewardship.349.htm (accessed on 31 January 2013).
61. Household Appliances—Labeling. Available online: http://ec.europa.eu/energy/efficiency/labelling/labelling_en.htm (accessed on 5 February 2013).
62. Fernandes, P.G.; Cook, R.M. Reversal of fish stock decline in the Northeast Atlantic. *Curr. Biol.* **2013**, *15*, 1432–1437.