Product Information Requirements of the Ecodesign Regulations
Non Directional Lamps, Electric Motors and Televisions

National Measurement Office

Enforcement Authority

Coordinator: Stephen Biswell.
National Measurement Office.
Stanton Avenue.
Teddington.
TW11 0JZ
E-mail:stephen.biswell@nmo.gov.uk
Web: www.nmo.gov.uk/enforcement

March 2013

Executive Summary

This report follows on from a desk based study which assessed compliance of suppliers (manufacturers and retailers fulfilling the role of Original Equipment Manufacturers (OEM)) with the specific Product Information Requirements (PIR) within the following Ecodesign Regulations:

- Electric Motors
- Non Directional Lamps
- Televisions

The PIR is a list of data that suppliers are required to provide when distant selling, which makes information available regarding the performance and environmental impact of a product.

Preliminary research and legislative appraisal was carried out for each of the regulations prior to engagement with trade associations. This enabled a risk profiling exercise to determine a list and type of products to review. The study was conducted for each of the three Ecodesign regulations, and recorded 18000 items of data for a total of 2142 products, which encompassed 611 Non Directional Lamps, 754 Televisions and 777 Electric Motors, across 57 suppliers.

The results when analysed as a total, found that the actual provision of PIR information by the suppliers, relative to what was actually required by the Ecodesign regulations, was estimated to be between 36% disclosed for Televisions, 42% for Non Directional lamps and 47% for Electric Motors.

A Non Compliance Index was also generated for each group which established non compliance (NC) as a percentage against the PIR requirement. The index score was categorised by way of Severe (SEV. NC :> 75%), Significant (SIG.NC: 50-75%), Marginal (MAR.NC: 25-50%) and Satisfactory (SAT.NC :< 25%). Overall the survey found that 24% of Lamps and 34% of Televisions demonstrated a Severe (SEV) Non Compliance Index, where as Electric Motors 86% were Marginal. Lastly, only 2% of Lamps and 3% of Televisions managed a Satisfactory (SAT) level of non compliance.

The results suggest that for these three selected regulated products, those suppliers who were identified as placing goods on the market, have not satisfied the expected delivery of PIR. The picture therefore develops of three regulated energy using products, which in use between them place substantial demands upon European energy targets and from the subsequent findings of this PIR survey demonstrated a poor overall PIR provision, and as a consequence identifies suppliers who are then unable to deliver the required data as to the energy efficiency and environmental impact of their products.

However, the outlook is not all negative as there were a number of model suppliers across the three selected products that were able to provide a very encouraging compliment of the required information, although the distribution was relatively small. The outcome of the project was that with Lamps and Televisions recording a joint Severe (SEV) and Significant (SIG) non compliance of 62% and 76% respectively, there is an obvious need to improve PIR compliance levels. This will ideally not only reassure those suppliers already attempting compliance and sustain the credibility and justification for PIR, but further assist those market surveillance authorities that monitor PIR to ensure energy efficiency requirements are being followed.

Finally, it was also apparent that there were instances of confusion as to the interpretation of the requirements for some of the PIR points and it follows that an initiative by way of a template could clarify how the PIR might best be conveyed and ensure a uniform approach to presentation, thereby supporting improved compliance levels.

Contents

1. Project Introduction

The 2008 Climate Change Act legally binds the UK Government to reduce greenhouse gas emissions (carbon dioxide and the other greenhouse gases covered by the Kyoto Protocol) by at least 80% by 2050, compared to 1990 levels. In order to do this, the Climate Change Act established a budgeting system that requires the Government to set binding limits on UK emissions for each successive five year period, beginning 2008-2012, and requires at least a 34% reduction against a 1990 baseline by 2020. Through the 2009 Low Carbon Transition Plan, these budgets have been set and products policy, including the European Eco-design Framework Directive for Energy Related Products (2009/125/EC), will be an important contributor to achieving these targets.

The Eco-design Framework Directive, via product specific implementing measures, sets minimum energy performance standards and/or product information requirements for domestic, non-domestic and industrial sectors. The Directive requires manufacturers to reduce the energy consumption and negative environmental impacts of their products. One requirement of the Eco-design Regulations is for manufacturers to make publically available (on their website) information on the performance of their products. These requirements differ from product to product and are set out in the annexes of each regulation. To date, little research has been conducted to evaluate the availability and accessibility of these requirements.

The purpose of this project was therefore to assess a selection of manufacturers' websites for the three product groups Televisions, Electric Motors and Non Directional Lamps.

2. Desired Outcomes

- Identify levels and quality of data provision for product information requirements
- Evaluate comparability of data
- Assess how well the product information provided could assist consumers in the purchasing decisions
- Influence the Market to improve levels of compliance

This was to be delivered mainly through a desk based research of products currently regulated under Ecodesign implementing regulations.

3. Intended Deliverables

- Basic market review of relevant regulated products to determine any higher risk areas
- Continual feedback through normal channels to keep Defra informed of progress and findings throughout the delivery period
- Final Report including technical annexes where appropriate. The report will be produced in a restricted access version and a version suitable for publication if appropriate
- NMO to share findings as appropriate

4. General Methodology

The aim of this survey was to ensure that the approach taken in the way products were selected, suppliers chosen, data gathered, analysis conducted and the conclusions submitted, would provide a model consistent throughout the project, and be of help for future projects concerning other products, as well as assisting toward the interpretation of the data recorded.

The project was broken down into a number of preliminary phases for each product type, in order to establish the best approach that would satisfy the intended deliverables of the overall project. The preliminaries were approached in such a way that the project was purely web based and that all data gathered relied upon that data which was made available at the time by the respective suppliers of the selected products, when offering on line distant selling.

The Preliminaries agreed were as follows:

- **Legislation** – The Implementing regulations under the Ecodesign Directive that applied to each product groups (TV's, Electric Motors and Non Directional Lamps) were reviewed and an understanding of the legislation gathered. It soon became clear that the Product information Requirements (PIR) varied between the three groups and that within the implementing Regulations were products that were exempt and would require exclusion from the project. The initial PIR points of information or as termed in this project "Packets" by product were initially determined to be:

    - **Lamps – 18,**
    - **Motors – 12,**
    - **TV's – 5.**

The "Packets" refer to the resultant specific items of information to be recorded as part of the survey, where each particular point of the Product Information Requirement as outlined in the implemented regulation for each of the selected products above, has been broken down into their respective parts.

- **Trade Associations –** Where possible, the particular Trade Associations or Member Organisations that best represented those suppliers for each product area were approached and assistance requested concerning UK market penetration by product type and suppliers.

- **Preliminary research –** a short amount of time was taken to carry out a snap shot look at the circulation of the products and manufacturers and how they were represented on the web. From this activity it was hoped to be able to achieve some of the following outcomes;

    - Availability of the product
    - Compliance against requirements.
    - Quality.
    - Accessibility.
    - Comparability.
    - Demonstrate accuracy and traceability of data collection.
    - Data of sufficient volume to allow Qualitative Analysis.
    - Survive interrogation.

The preliminary research was also used for how best to design a means of data capture that would allow for analysis and investigation.

- **Risk Analysis** – From the preliminary research and Trade Association data, an attempt was made to focus on particular sectors of the market. Especially so for the Lamp and Electric Motors, which were soon discovered to be quite diverse market sectors.

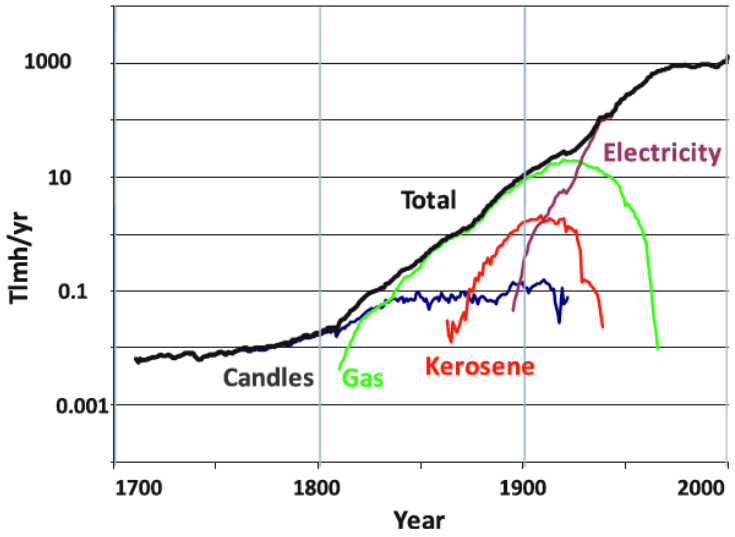
- **Product Targeting –** It was clear that some suppliers had quite large product ranges. Furthermore it was also felt that some uniformity in the selection of the products to be targeted would allow for a balanced analysis. Product targeting was therefore conducted for each of the three products groups.

- **Data Capture –** A spreadsheet was generated that would fulfil all of the necessary requirements of data collection. A dual screen setup was also employed as this allowed for the spread sheet and web site to be viewed simultaneously. The data recorded for each of the three product groups consisted of the following:

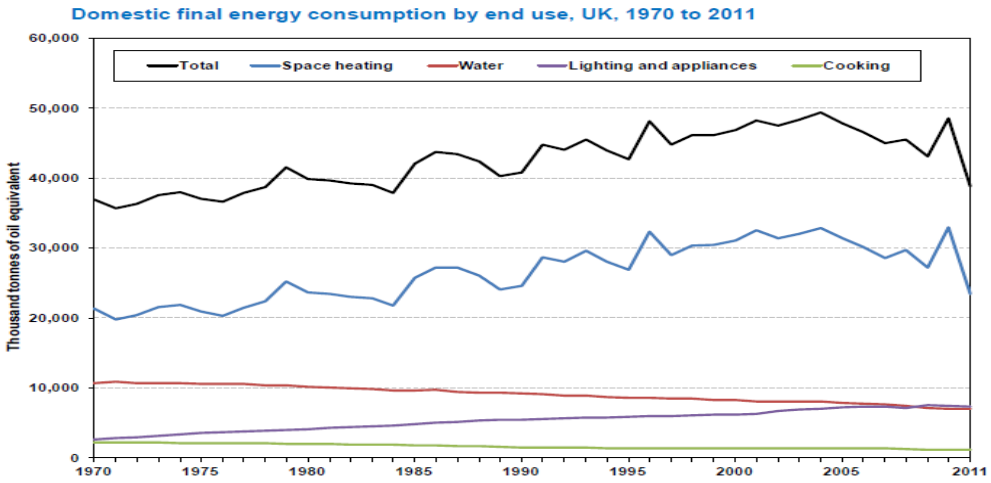
    a. **Identified PIR data Packets.**
    b. **Number of Clicks/Key Strokes -** to find the required PIR data.
    c. **Manufacturer/Supplier web details** – for future contact.
    d. **Quality score for the Suppliers web site** – This had been developed out of the preliminary survey in terms of the general feel and look of a particular website, rated as being VERY GOOD, GOOD, FAIR and POOR. The scoring was subjective, but it was decided that by retaining the same researcher for the project, did create a more informed perception by comparison when allocating the score.
    e. **Time log/date stamp** - by way of AM or PM as to when a particular site was visited. This provided a time line to support future surveys and would help should the gathered data need to be used for reference.
    f. **Comments -** A column was created for making notes concerning any observed features of a site. In addition to this the researcher was also required to maintain a log of the suppliers recorded, which would serve to provide more detailed comment, feedback and picture as to the overall presentation of a particular suppliers website**.**

5. Non Directional Lamps

Lighting through history as seen in the graph below has been provided by many forms of energy, which have come and gone as new technology has developed. However, lighting today is predominantly provided by electricity.



Lighting represents up to a fifth of a household's electricity consumption. There is a four to five-fold difference between the energy consumption of the least efficient and the most efficient lighting technologies available on the market. This means that upgrading lamps to more efficient varieties has the potential to reduce a household's total electricity consumption by up to 10-15%.



Since 1990 electricity consumption from consumer electronics increased by 74% and wet appliances by 23%, whilst electricity consumption from lighting appliances and cold appliances fell by 21% and 19% respectively, reflecting improved product efficiency (Dept of Energy and Climate change - Publication URN: 12D/291).

The period from September 2009 to September 2012 has seen a gradual phasing out of inefficient incandescent lamps. Before the phase-out began in 2009, estimated 200M incandescent lamps were sold each year in the UK. The restriction on their sale is predicted to save 39 terawatt-hours of electricity across the EU annually by 2020. The Lighting Industry has responded by providing a

greater and more varied selection of energy saving alternatives by way of LED, Compact Fluorescents and Xenon Halogens as the predominant consumer offerings.

Such new lamps technologies have the potential to provide savings in the region of 25 to 80% compared to traditional incandescent. However the perceived cost of such new technologies and the slow introduction of innovative designs have discouraged consumer engagement. Furthermore, there is a trend now to use more and more lighting in our homes. The popularity of halogen downlighters in homes has halted the decline in energy use. This will continue until LED down lighters become the norm and the lamp of choice.

A Green Paper of July 2012 - (Green Paper "Lighting the Future: Accelerating the deployment of innovative lighting technologies" COM [2011] 889), which dealt with Solid State Lamps (SSL) / LED quotes “Information for the consumers in all forms is equally important. Consumers need to be educated, market actors trained and high quality information on all application options and possibilities, needs to be available to all. SSL advantages and disadvantages, best practice, pilot actions, research results and intelligent solutions need to be communicated at European level”.

Katy Bryan, sustainability manager at Philips UK, one of the largest lamp manufacturers, said in a recent Guardian article that “Lighting consumes 19% of electricity globally." This poses a major challenge, in a world facing resource scarcity and climate change. Energy-efficient lighting can help and legislation that raises the profile of energy-efficient technologies, such as LED, is naturally welcomed. However, more can be done to educate consumers on the choices available to them and to ensure they understand that there is no need to compromise, as energy efficiency does not have to mean poor design or performance."

The annual electricity consumption related to products subject to the Ecodesign Regulations for Non Directional Lamps was estimated to be 112TWh in 2007, corresponding to 45Mt carbon dioxide emissions. Without taking specific measures, the consumption is predicted to increase to 135TWh in 2020. Preparatory studies have showed that electricity consumption of products subject to this Regulation can be significantly reduced (Regulation No. 244/2009).

The Product information Requirement (PIR) component of the Ecodesign is just one of those parts of the information stream that is available to consumers and market surveillance bodies, and this project will look to establish the availability, ease of access, content and quality of the PIR as made available by suppliers for Non Directional Lamps.

5.1 Product Specific Methodology: Non Directional Lamps

5.1.1 Implementing Legislation

Over the past decade lighting has become subject to numerous regulations issued by the European Commission with the intention of encouraging the provision of energy information and the innovation toward more energy efficient lighting products.

One notable piece of legislation is the Ecodesign Framework which attempts to ensure lamp technology provides consumers not only with innovative energy saving products, but equally there is the information available for them to make the necessary informed choice. Such information is either available at the point of sale as part of the packaging or by way of distance selling information as part of a web site, in those situations when the consumer is unable to view the actual physical product.

The focus of this survey will be to look at how particular Non Directional Lamps are being placed on the market by manufacturers and suppliers through their websites and how the PIR provision complies with the Ecodesign requirements for Non Directional Lamps as stated in Regulation No. 244/2009 which implements Directive 2005/32 /EC of the European Parliament.

Article 1, "Subject Matter and Scope" of the above regulations, does "*establish Ecodesign requirements for the placing on the market, non directional household lamps"* where within the context of the Directive *"placing on the market"* means making a product available for the first time on the Community market with a view to its distribution or use within the community, whether for reward or free of charge and irrespective of the selling technique.

Products subject to this regulation are designed essentially for the illumination of a household room by replacing natural light. Directional lights (spot lights) with a cone within 120' are not covered.

5.1.2 Product Information Requirements (PIR)

The PIR for Non Directional Lamps is located in Annex II, section 3.2 of the Implementing Regulations No. 244/2009 and states:

3.2. Information that is to be made publically available on free-access websites.

As a minimum, the following information shall be expressed at least as values.

(a) The information specified in point 3.1;

3.*1 reads: Information to be visibly displayed prior to purchase to end-user on the packaging and on free access websites*

The Information does not need to be specified using the exact wording of the list below. It may be displayed using graphs, figures or symbols rather than text.

- **a.** When the nominal lamp power is displayed outside the energy label in accordance with Directive 98/11/EC, the nominal luminous flux of the lamp shall also be separately displayed in a font at least twice as large as the nominal lamp power display outside the label
- **b.** Nominal life time of the lamp in hours (not higher than the rated life time);
- **c.** Number of switching cycles before premature lamp failure
- **d.** Colour temperature (also expressed as a value in Kelvin's).
- **e.** Warm-up time up to 60 % of the full light output (may be indicated as 'instant full light' if less than 1 second);
- **f.** A warning if the lamp cannot be dimmed or can be dimmed only on specific dimmers;
- **g.** If designed for optimal use in non-standard conditions (such as ambient temperature Ta ≠ 25 °C), information on those conditions;
- **h.** Lamp dimensions in millimetres (length and diameter);
- **i.** If equivalence with an incandescent lamp is claimed on the packaging, the claimed equivalent incandescent lamp power (rounded to 1 W) shall be that corresponding in Table 6 of the Regulations to the luminous flux of the lamp contained in the packaging.

The intermediate values of both the luminous flux and the claimed incandescent lamp power (rounded to 1W) shall be calculated by linear interpolation between the two adjacent values.

j. The term ‘energy saving lamp’ or any similar product related promotional statement about lamp efficacy may only be used if the lamp complies with the efficiency requirements applicable to non-clear lamps in Stage 1 according to Tables 1, 2 and 3 of the regulations.

(b) Rated wattage (0, 1 W precision);
(c) Rated luminous flux;
(d) Rated lamp life time;
(e) Lamp power factor;
(f) Lumen maintenance factor at the end of the nominal life;
(g) Starting time (as X, X seconds);
(h) Colour rendering.

If the lamp contains mercury

(I) Instructions on how to clean up the lamp debris in case of accidental lamp breakage;
(j) Recommendations on how to dispose of the lamp at its end of life.

5.2 Survey Preliminaries: Non Directional Lamps

Legislation – From the requirements within the regulations the total data to be collected as part of the PIR amounted to an initial estimate of nineteen points of information; however it soon became clear that within certain sentences of the PIR there arose choices by way of “and” which added to the actual PIR quota. For ease of understanding it was decided to term the PIR items as “Packets”.

Preliminary Research - A small amount of preliminary research was conducted to establish the level of market penetration of manufacturers who marketed lamps by way of distance selling. Some of this initial review was to build an appreciation of the type of typical products that were being offered to consumers on line.

The variety of lamps on the market posed questions as to how best to approach the selection of which lamps should be targeted. Following review of the legalisation and an understanding of the main types of lamps available to the consumer, it was decided to concentrate efforts toward the following groups of lamps across all watts:

1. Tungsten Halogen
2. Compact Fluorescents
3. LED

Trade Associations – in conjunction with the preliminary research, Trade Associations particularly the Lighting industry Association, were approached to develop an understanding of those manufacturers who were known to operate and had an established market share toward the supply of lamps within the UK. A list of popular brands provided was then used as the basis for the initial survey works, as well as research put toward those manufacturers who were placing on the market own brand products (OEM).

From information provided by the Trade Association, the web sites of the following suppliers having an influential presence within the UK would be surveyed:

- Philips,
- Osram,
- GE,

- Havells-Sylvania
- Megaman, Status International
- Technical Consumer Products
- Toshiba
- Panasonic

Lamps from the selected groups would be recorded from within the lumen range 200 to 1300 which is approximately equivalent to between 25 to 100w.

Risk Assessment – Reliance was placed on information provided by the Trade Association when drawing up the provisional list of manufacturers whose products were to be recorded as part of the survey. The preliminary survey also provided links to Suppliers (OEM) who placed their own brand name on products. Such a situation arose predominantly with a number of established high street and on line retailers. This consequently created a supplier list that was made up of predominantly Manufacturers and online Retailers.

Product Targeting – The selection of the lamps type to be targeted was done on the basis of those varieties that were not only within scope of the Ecodesign regulations, but also were found to be predominantly mentioned within third party reports and research. However with the ever developing advances in lamp technology, new products such as LED could not be ignored, especially as the Ecodesign Regulations EU No. 1194/2012, (Requirements for directional lamps, LED lamps and related equipment) specifically mentions LED.

The Predominant three class of lamps covered were selected from the following as they characterised products that were commonly to be found in domestic environments.

i) Tungsten Halogen – These are filament lamps in which the tungsten filament is surrounded by halogen gas. They are bright and crisp lights in many shapes can last up to 2 years. Have a power range between 18 to 70w with lumens of minimum 200 to a max of 1300.



ii) Compact Fluorescent (CFL) - Means a unit which cannot be dismantled without being permanently damaged. A more compact shape compared to traditional strip fluorescents. The ballast for starting and stable operation is built into the unit. Can last 10 years. Power range from 9 to 20W, and a lumen range from 400 to 1200.

iii) LED – More readily available on the domestic market and can last up to 25 years. Operate by way of a solid state device emitting optical radiation. Lower power demand of 4.5 to 14.5w, and a lumen range of 200 to 1100.

Finally, **Fluorescent strip** lamps which are the precursor of CFL's comprise a discharge lamp of the low pressure mercury type with integrated ballast, traditionally in the form of a strip. However, although common in many commercial applications, the Non Directional Ecodesign regulations makes mention of integral ballast and from the findings of the preliminary research it was felt that available descriptions on many supplier websites were not sufficiently clear to be able to differentiate between integral and non integral ballast fluorescent strip lamps. These lamps were therefore not considered for selection.

Data Capture - Given the number of lamps types available by manufacturers it was felt that primary Data Collection would be carried out by way of a layered approach rather than an intensive blanket survey of the product area.

As a consequence of the findings and across a range of set lamp wattages shown below, the identified lamp types (tungsten halogen, compact fluorescent and LED) were investigated from each selected Supplier. As data was collected flexibility was built into the process to allow for revisions in the event that the exact intended lamp wattages were not available.

An attempt was made to focus on that wattage of lamps highlighted below that were predominantly main stream in terms of purchasing patterns and had comparisons with those tungsten lamps that had been subject to phasing out.

Incandescent Equivalent watts (w)	Approx Lumens	Tungsten Halogen (w).	Compact fluorescent (w).	LED (w).
100	1200 - 1000	70	20	14.5
75	1000 - 800	52	15	12
60	600 - 700	42	11	
40	300 - 500	28	9	8
25	200	18		4.5

5.3 Results: Non Directional Lamps

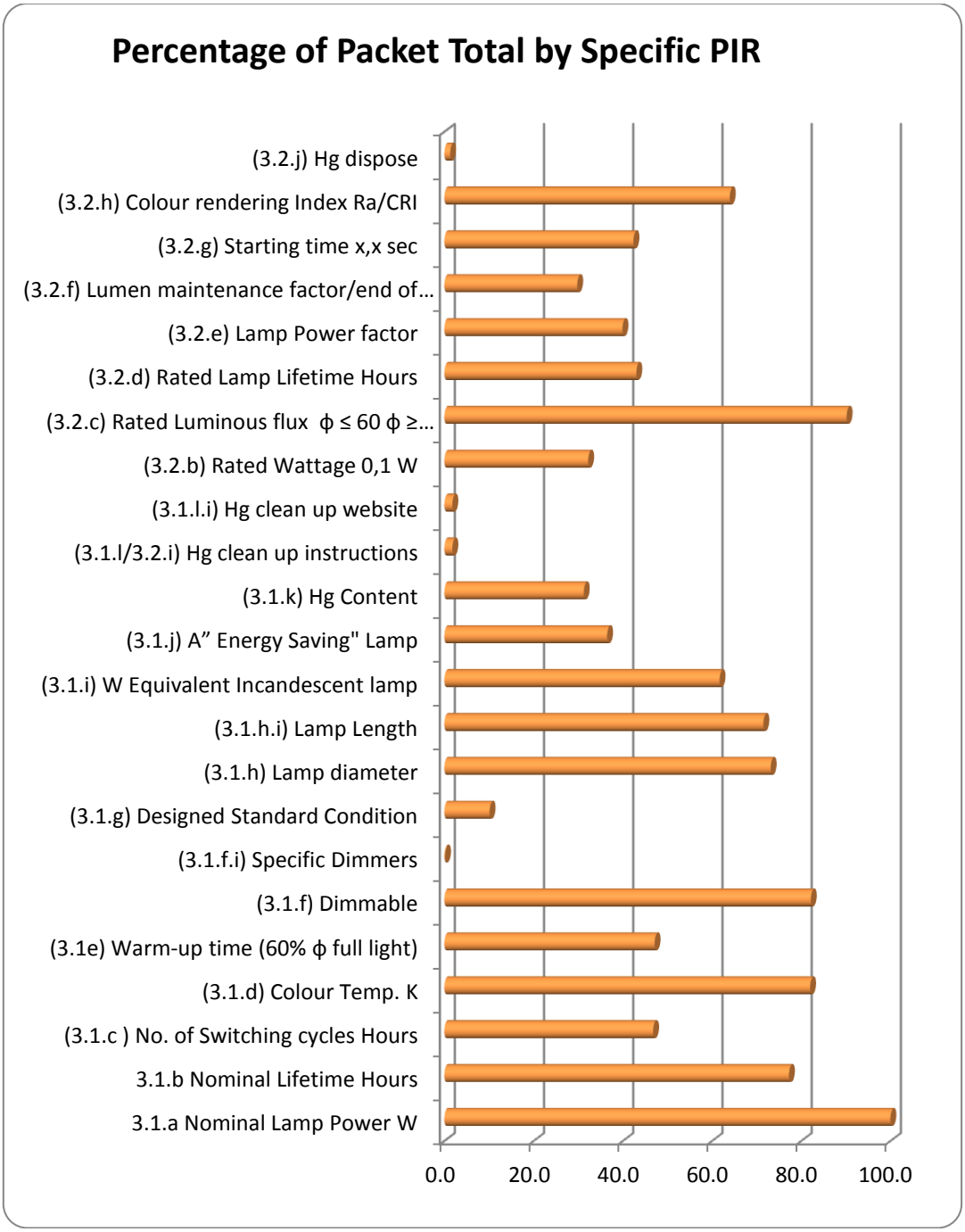
The full data capture for Non Directional Lamps has for the reasons of impartiality been omitted from this report. However the following illustrations have been lifted from the results data and provides a summary of the Packet Frequency by specific required PIR packet.

TABLE.3 below provides a breakdown of the products recorded by specific packets. In total there are 23 packets. The legislation lists 19 points, however the points within the Regulations mentioned some *"and"* selections.

TABLE. 3:PIR Record by data packet, Frequency & Percentage for Non Directional Lamps			
PIR Ref	**PIR Packet**	**Packet Frequency**	**Percentage (%)**
1. (3.1.a)	Nominal Lamp Power W	611	100
2. (3.1.b)	Nominal Lifetime Hours	472	77.3
3. (3.1.c)	No. of Switching cycles Hours	286	46.8
4. (3.1.d)	Colour Temperature. K	501	82.0
5.(3.1.e)	Warm-up time (60% ϕ full light)	288	47.1
6. (3.1.f)	Dimmable	502	82.2
7. (3.1.f.i)	Specific Dimmers	1	0.2
8. (3.1.g)	Designed Standard Condition	62	10.1
9. (3.1.h)	Lamp diameter	447	73.2
10 (3.1.h.i)	Lamp Length	437	71.5
11 (3.1.i)	Watt Equivalent Incandescent lamp	377	61.7
12 (3.1.j)	"A" energy saving	223	36.5
13 (3.1.k)	Hg (Mercury) Content	191	31.3
14(3.1.l/3.2.i)	Hg clean up instructions	11	1.8
15(3.1.l.i)	Hg clean up website	11	1.8
16 (3.2.b)	Rated Wattage 0,1 W	197	32.2
17(3.2.c)	Rated Luminous flux ϕ ≤ 60 ϕ ≥ 12000Lm	551	90.2
18 (3.2.d)	Rated Lifetime Hours	263	43.0
19(3.2.e)	Power factor	244	39.9
20 (3.2.f)	Lumen maintenance factor/end of life LLMF	182	29.8
21(3.2.g)	Starting time x, x sec	259	42.4
22(3.2.h)	Colour rendering Index Ra/CRI	391	64.0
23 (3.2.j)	Hg (Mercury) dispose	8	1.3
TOTAL		**6515**	

A review by packet total, **FIGURE.3** below, sees the *"nominal lamp power 3.1.a"* receive the most recorded packets with 100% entries, followed by "rated luminous flux"(17), "dimmable"(6) and "colour temperature"(4). These mentioned packets can be assumed to provide the minimal information that might be reasonably required when looking to select a lamp. However information such as the disposal instructions for "Mercury" (23), "nominal lifetime hours" (2) and "starting time" (21) are not given equal prominence.

Figure.3: Percentage of packet Total by Specific PIR for Lamps



5.4 Discussion: Non Directional Lamps

The background to the survey had at its core a number of desired outcomes;

Identify levels and quality of data provision for PIR.

The survey recorded a total of 611 lamps, consisting of Halogen, Compact Fluorescent and LED, spread over 21 supplies, consisting of 14 Manufacturers and 7 online Retailers selling OEM products. In total this gave rise to the data capture of 6515 PIR packet of information from the 611 products that were recorded.

The Ecodesign implementing regulations for Non-Directional Lamps makes reference to 19 points of information to be made publicly available on free access websites. When these points as sentences are broken down, the 19 points by way of interpretation have the potential to increase this number to 23 separate packets.

The analysis showed that out of these 23 packets the actual findings was closer to a mean of 10.7 across all suppliers and products. Those particular packets to be most recorded at a level above 60% as shown in **FIGURE.3 above** were those that related to the following:

- Nominal Lamp Power: 1. (3.1.a)
- The Rated Luminous Flux: 17(3.2.c)
- Nominal Lifetime Hours: 18 (3.2.d)
- Colour Temperature: 4. (3.1.d)
- Dimmable: 6. (3.1.f)
- Lamp Length and Diameter: 9. (3.1.h) & 10 (3.1.h.i)
- Colour Rendering: 22(3.2.h)

For the most part the packets listed above consist of those that might reasonably be considered to be the information of choice when the typical consumer is looking to make a product selection.

The overall level of PIR provision across the potential 23 packets saw peaks at around 8 to 10 and between 17 and 18 packets of data, which relates to 194 and 118 of all lamps respectively. These two ranges account for just over half of all lamps and mainly consist of large and medium sized Manufacturers.

Retail OEM supplies apart from some exceptions, are concentrated at mainly the low end of the PIR provision. Also the level of provision does not appear consistent for some suppliers. Some of the Manufacturers although recording good PIR at one end of the scale and achieving 21, can within the same website drop to 6. Ideally a consistent approach has the potential to be better influenced by a marker surveillance authority, rather than the situation where a particular supplier is demonstrating a varied level of PIR prevision.

Generally, those suppliers who are established high street retailers demonstrated a less varied range of PIR, although at a much lower level of compliance. This would invariably provide scope for improvement, rather than having to seek explanation as to why a relatively good performing Manufacturer presents an inconsistent approach to PIR provision.

Quality of provision was evaluated by way of a number of clicks and the perceived “Quality of Assistance” of the website from which the PIR information was gathered. The clicks or keystrokes were measured from the first page of the site. Generally it was found that the majority of clicks were

about 3 to 4. The primary keystroke basically dealt with selecting the product group, followed by the actual product, where some PIR information might be available, to then be finally redirected to a PDF where a full list of PIR was available

The Quality of Assistance also had an influence on how well the actual PIR came across to the viewer. There was for 60% of most lamps the indication that the Quality of Assistance was "good" to "very good", with "poor" amounting to only 20%. The overall impression of clarity, "clickability" and presentation made for improved PIR identification. Furthermore a comparison of clicks versus Quality of Assistance found very little correlation, except in the case of two OEM Retailers where poor website design provided PIR accessibility at two clicks, although the delivered PIR in both cases were deficient and only 17% compliant.

Finally, there were websites that demonstrated a high standard, and it may be these that could potentially provide the standard as to how PIR should be presented.

Evaluate Comparability of Data.

Annex II 3.2 of the Ecodesign Regulations for Non Directional Lamps relating to the PIR provision states that *"Information to be made publicly available on free access website. As a minimum, the following information shall be expressed at least as values".*

In most cases when information was made available it was not always comparable like for like. Obviously certain supply websites would follow a specific corporate style. This was reflected in the scoring against Quality of Assistance (QA), and if a particular style assisted towards whether the PIR was sufficiently clear. It was evident that PDFs tended to be the favoured choice for displaying the PIR.

One notable area was the PIR provision for "in case of breakage" (Packet 14 of **TABLE.3**) above which although only recording 1.8%, varied considerably as to the information that was actually provided. Conversely for Packet 12 of **TABLE.3** "Energy Saving", it was observed that one of the large manufacturers completed this point with the wording quoting "Energy Saving Lamp: No".

The data also shows that there is apparent inconsistency across some suppliers even for those that are providing some of the best PIR scores. The PIR provisions seem to have been attempted for some of the data package, but not all.

Assess how well the product information provided could assist consumers in their purchasing decisions.

The intention of the current Ecodesign regulations for Non Directional Lamps is to increase the market penetration of energy efficient products and see the removal of those that are unable to satisfy a particular level of efficiency. The question is therefore whether from the findings of the survey if the PIR can be shown to assist consumers and delivers information to enable efficiency comparisons.

From **TABLE.5 (Distribution of total PIR across the Lamp Suppliers by Manufacturer and Retailer**) below it is apparent by review of the "Mean of Means" 9.7, that for some suppliers and particularly those representing the main manufacturers, are delivering encouraging instances of PIR provision, however when looking at **FIGURE.3** above of Percentage of Packet Total by Specific PIR, it is quite clear that those peaks corresponding to 80% visibility of a packet only relate to 4 main items , they being "Rated Luminous Flux" (3.2c), "Dimmable" (3.1f), "Colour Temperature" (3.1.d)

and “Nominal Lamp Power” (3.1.a), which amounts to just over 17% of the total PIR requirement. Furthermore it would appear that this 17% can be construed to relate to the most basic of information for a lamp.

TABLE.5: Distribution of total PIR across the Lamp Suppliers

PIR Freq	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total	MEAN
Manufct.1													10	11	7	3	15	14				60	15.7
Manufct.2														1		1	22	12		2	3	41	17.6
Manufct.3								5		15	14		7				14					55	12.2
Manufct.4						14						3				1	7	2	6			33	12.3
Manufct.5					6	6		26														38	7.2
Manufct.6						1	3							11				12				27	14.7
Manufct.7								12	15	16												43	9.1
Manufct.8									8													8	8
Manufct.9															1		6	14				21	17.6
Retailer.21				2	20	1																23	5
Manufct.10								23	13													36	8.4
Manufct.11										5	7											12	10.6
Retailer.16		2		9	1	2	4															18	4.7
Retailer.17			1												1	22						24	14.7
Retailer.18	8	1	7																			16	1.3
Retailer.15		1	28	1																		30	3
Retailer.19				1	3	2																6	5.2
Retailer.20			2	12		13																27	4.9
Retailer.14								10	20													30	8.7
Retailer.12							5	4	8													17	8.2
Retailer.13										14			1	31								46	12.8
Total	**8**	**4**	**38**	**25**	**30**	**39**	**12**	**81**	**64**	**50**	**21**	**3**	**18**	**54**	**8**	**27**	**64**	**54**	**6**	**2**	**3**	**611**	**9.6**

For most consumers this might be considered all they need, although this has the potential to make the remaining 83% of the information redundant; however this is not the intention of the regulations as the consumer runs the risk of lacking the visibility of those points of the PIR that provides others aspect of comparative data. In addition market surveillance authorities will lack the data to assess whether Ecodesign is being implemented correctly by the suppliers.

It is true that the consumer requires a reasonable array of data to make an informed choice, however the amount potentially available can create the situation where the data can be complex or perceived as overloading the consumer. This in turn discourages supplier application and hence credibility for what might be then considered a burdening task. The approach becomes haphazard and detriments those suppliers who attempt to comply.

This is particularly so, as shown by the survey, which highlights the significant difference between suppliers who are true Manufacturers and those that are OEM Retailers. The former is supplying primarily to those retailers that sell on and direct to consumers, whereas the latter is geared more to retail consumers. Both groups need to provide the correct information, but their audience needs are quite different, as the PIR not only provides for consumer choice, but is there to ensure that there is a means by which the market can be seen to supply products that are efficient and that efficiency can be compared.

Influence the market to improve levels of compliance.

The survey clearly demonstrated that only just under 2% of suppliers managed to satisfy a Non-Compliance Index of Satisfactory (SAT) which was the equivalent to 19 to 23 of the required PIR packets. The remainder of the survey saw 50% non-compliance measured as Significant (SIG) and Severe (SEV) for nearly 60% of all products recorded and was attributed to over 50% of all Manufacturers and 90% of all OEM Retailers.

Non compliance at Significant (SIG) and Severe (SEV) suggest that the suppliers are only providing 50% of the required PIR information as implemented by the regulations. Furthermore the area that creates most concern is that of OEM Retailers who as a group are quite similar in their poor approach to displaying PIR.

However, the manufacturers are somewhat more widespread as to the demonstration of compliance, with some displaying good compliance, whilst others are scattered over the range of PIR that is required.

Ideally the intention would be to see compliance move towards the Satisfactory (SAT) end of the scale. The manufacturers would need to demonstrate a more consistent approach and questions would need to be asked as to why in some cases non compliance can be seen to range from Severe (SEV) to Satisfactory (SAT) for products from the same manufacturer.

Furthermore there is an obvious need to improve compliance for the Retailer OEM sector of the industry. It would seem that the essential information about a lamp is provided, however full complement of PIR is severely omitted in most cases. It may well be that the retailer OEM suppliers are not fully conversant to the legislation or they don't seem to understand the true intention of the legislation and the assistance that a full set of PIR conveys, both for the consumer and market surveillance policy makers.

5.5 Conclusion: Non Directional Lamps

The Ecodesign legislation is about encouraging the development and placing on the market products that are able to satisfy particular energy efficient parameters. Along with this is the ability of a consumer to be able to influence this efficiency and innovation by having visibility of information about a lamps performance. This in effect is the purpose of PIR, in that it promotes information about a product by way of particular specification data, which then allows a consumer to decide whether a product is delivering the required energy efficiencies and innovative performance, thereby potentially promoting the market penetration of such products.

Unlike energy labelling where such information is provided via a defined energy label, Ecodesign requires the making available of information that is to be presented on the web as Product Information Requirements (PIR). From the gathered data for the survey the findings for Non Directional Lamps seem to provide a picture of overall non-compliance.

It is fair to say that a number of suppliers, particularly the Manufacturers, do make an attempt to comply with the PIR, however in contrast those Retail suppliers acting as OEM, do seem to portray a sector that at best can only provide half of the required PIR Packets. There are individual cases of some encouraging provision of PIR, even for Retailers; however the overall impression is of an Ecodesign Regulation that is not being followed for compliance against PIR, by suppliers marketing via the web non directional lamps.

6. Electric Motors

Electric Motors convert electrical power into mechanical power within an electric motor- driven system (EMDS). The vast majority of the electricity used by an EMSD is consumed by the electric motor itself. Only a very small amount is used to power control functions or other ancillary circuits. Electric Motors and the systems they drive are the single largest electrical end-use of energy, consuming more than twice as much as lighting, the next largest end-use. It is estimated that EMDS account for between 43% and 46% of all global electricity consumption, giving rise to about 6 040 Mt of CO2 emissions.

By 2030, without comprehensive and effective energy-efficiency policy measures, energy consumption from Electric Motors is expected to rise to 13 360 TWh per year and CO2 emissions to 8 570 Mt per year. End-users now spend 434 billion Euros per year on electricity used in EDMS; by 2030, that could rise to almost 692 billion Euros.

The figures in the table below are the aggregate of the energy consumed by an array of different types of motors operating within a wide set of applications in every sector of energy use. The table suggests that the greatest opportunity for savings is to be found for those applications within the Industrial sector.

Sector	Electricity Consumption	% of all EMDS electricity	% of all sector electricity
Industrial	**4 488 TWh/year**	**64%**	**69%**
Commercial	**1 412 TWh/year**	**20%**	**38%**
Residential	**948 TWh/year**	**13%**	**22%**
Transport and agriculture	**260 TWh/year**	**3%**	**39%**

Source: IEA statistics, 2006 (National Electricity Demand); A+B International, 2009 (motors calculations).

The majority of electric motors in use draw less than 0.75 kW of power in a variety of small applications, mostly in the residential and commercial sectors. These motors account for only about 9% of all electric motor power consumption. In general, they are integrated into mass produced packaged applications such as refrigerator compressors, extractor fans, computer hard drives, etc.

Many of these applications are subject to policies that apply to the level of the packaged system, rather than the electric motor component, but many are still not subject to any policy requirements. In the European Union, for example, at the beginning of 2010, only about 38% of motor electricity consumption in the combined residential and commercial sectors was used in systems subject to minimum energy performance standards (MEPS).

The largest proportion of motor electricity consumption is attributable to mid-size motors with output power of 0.75 kW to 375 kW, and it is this range that is covered by the Ecodesign Regulations for Electric Motors**.** Many different motor technologies and design types are available, but

asynchronous alternating current (AC) induction motors are most frequently used and consume the most energy. These motors are either sold to original equipment manufacturers (OEMs) and integrated into pre-packaged electromechanical products (such as pumps, fans, compressors, etc.) or sold as stand-alone motors that final users then integrate into a specific application on site. Such stand-alone motors are produced in large volumes, according to standardised input power and size specifications, with varying channels to market and integration into electromechanical systems. This has a significant impact on the type of barriers to adoption of energy-efficient solutions for EMDS and, hence on the most appropriate policy packages to overcome such barriers.

Motors in the mid-size range are most commonly found in industrial applications, but they are also widely used in commercial applications, infrastructure systems and, less often, in the residential sector. Roughly 30 million new electric motors are sold each year for industrial purposes. Some 300 million motors are in use in industry, infrastructure and large buildings. These electric motors are responsible for 45% of global electricity. Motor technology has evolved over the last few decades. Superior so-called "premium" products are now available, ready to change the market toward energy efficiency and to contribute in lowering greenhouse gas emissions worldwide.

At present, most OECD (Organisation for Economic Co-operation & Development) and many non-OECD economies impose Minimum Energy Performance Standards (MEPS) on asynchronous mid-size AC motors sold as separate components. Very few countries have set such requirements for other types of electric motors, and the requirements are rarely applied specifically to motors integrated directly into a packaged system prior to sale; however the Ecodesign Regulations for Electric Motors No. 640/2009 takes the initiative and states that the regulations apply to manufacturers of products into which motors are incorporated.

Lastly the large electric motors with more than 375 kW output power are usually high-voltage AC motors that are custom-designed, built to order and assembled within an electromechanical system on site. They comprise just 0.03% of the electric motor stock in terms of numbers, but account for about 23% of all motor power consumption, making them very significant consumers of global power (about 10.4%). These motors are not currently subject to MEPS in any part of the world.

For any given output power rating, there is currently a spread of several percent in efficiency between the most and least efficient motors on the market. Despite being slightly more costly to purchase than standard motors, Higher-Efficiency Motors (HEMs) with over 1 000 hours of operation per year are more cost-effective over the system life for end-users in all applications, because motor-energy costs typically account for over 95% of a motor’s life-cycle cost. The Internal Rate of Return (IRR) from the use of a HEM compared to a standard motor is often well over 100%, but end-users rarely demand HEM applications, due to a host of market barriers. Mandatory regulations are usually the best way to ensure significant and timely market penetration of HEMs.

One important element of the Ecodesign Regulation is the focus on the Variable Speed Drive (VSD). Currently 90% of all motors are running at full speed no matter how much output is needed. Mechanical brakes slow down the motor when the full output is not needed. This process is very inefficient. VSD technology which is mentioned in the Ecodesign Regulations will ensure motors will only use energy as demanded of the power needs. It has been estimated that such a system could save 1,718 TWh globally.

6.1 Product Specific Methodology: Electric Motors

6.1.1 Implementing Legislation

The Implementing Regulations No. 640/2009 establishes Ecodesign requirements for the placing on the market and for the putting into service Electric Motors, including those that are integrated in other products.

Within the Regulations a 'Motor' means an electric single speed, three-phase 50 Hz or 50/60 Hz, Squirrel Cage induction motor that:

- has 2 to 6 poles,
- has a rated voltage of *U N* up to 1 000 V,
- has a rated output *P N* between 0,75 kW and 375 kW,
- Is rated on the basis of continuous duty operation.

Where the following definitions apply;

- *'Squirrel cage motor'* means an electric motor with no brushes, commutators, slip rings or electrical connections to the rotor.
- *'Pole'* means the total number of magnetic north and south poles produced by the rotating magnetic field of the motor. The number of poles determines the base speed of the motor.
- *'Continuous duty operation'* means the capability of an electric motor with an integrated cooling system to operate at nominal load without interruption below its rated maximum temperature rise.

In addition the Regulation comprises Ecodesign requirements which shall apply in accordance with the following timetable: *"from 16 June 2011, motors shall not be less efficient than the IE2 efficiency level, as defined in Annex I, point 1 of the regulations, which states percentage improvements".*

6.1.2 Product Information Requirements for Electric Motors

Within the Regulations No. 640/2009 at Annex I.2 the Product Information Requirements are covered as follows:

From 16 June 2011, the information on motors set out in points 1 to 12 shall be visibly displayed on:

(a) The technical documentation of motors;

(b) The technical documentation of products in which motors are incorporated;

(c) Free access websites of manufacturers of motors;

(d) Free access websites of manufacturers of products in which motors are incorporated.

As regards to the technical documentation, the information must be provided in the order as presented in points 1 to 12. The exact wording used in the list does not need to be repeated. It may be displayed using graphs, figures or symbols rather than text. The PIR packets are:

1. Nominal efficiency (η) at the full, 75 % and 50 % rated load and voltage (U N);

2. Efficiency level: 'IE2' or 'IE3';

3. The year of manufacture;

4. Manufacturer's name or trade mark, commercial registration number and place of manufacturer;

5. Product's model number;

6. Number of poles of the motor;

7. The rated power output(s) or range of rated power output (kW);

8. The rated input frequency(s) of the motor (Hz);

9. The rated voltage(s) or range of rated voltage (V);

10. The rated speed(s) or range of rated speed (rpm);

11. Information relevant for disassembly, recycling or disposal at end-of-life;

12. Information on the range of operating conditions for which the motor is specifically designed:

(I) Altitudes above sea-level;

(ii) Ambient air temperatures, including for motors with air cooling;

(iii) Water coolant temperature at the inlet to the product;

(iv) Maximum operating temperature;

(v) Potentially explosive atmospheres.

The information referred to in points 1, 2 and 3 shall be durably marked on or near the rating plate of the motor.

6.2 Survey Preliminaries: Electric Motors

Legislation – Annex I.2 of Regulations No.640/2009 makes mention of the 12 packets of information listed above that must be provided within a particular order when conducting distance selling by way of a web site. However in common with the other regulated product groups in this project, the actual PIR data to be recorded is adjusted by virtue of *"ands" / "or"* within the stated points. Further adjustments are made for added items as part of points. The legislation also mentions a number of exclusions by way of the power rating minima and maxima (0.75 – 375kW) and also that bespoke motors are not covered. These are factors that were considered when creating a target list of regulated motors.

Trade Associations – Contact with the relevant Trade Association REMA (Rotating Electrical Machines Association) generated a list of those suppliers that were not only members of the association, but had a major influence on the UK market place. They were:

- ABB
- Siemens
- Brook Crompton
- Regal

- ATB
- Weg

Preliminary Research - The complex nature of Electric Motors required considerable research was required to develop knowledge of the technical terms and ensure that only those products that were covered by the scope of the regulations were captured. Generally the initial impression from preliminary research was that most of the web sites assumed that the reader would have some technical knowledge of the product.

Risk Analysis - Motors differ from Lamps and TV's in that as a product its application is more directed at the trade or a knowledgeable end user rather than the more traditional high street consumer, it was therefore more challenging to indentify suppliers who were not the main manufacturer, but rather suppliers of own branded OEM (Original Equipment Manufacturer) products that had been imported, who thereby then took the responsibility of the primary supplier.

A parallel survey of motors enabled OEM suppliers to be identified by a method known as Search Engine Optimisation (SEO). By this method a number of electric motor terms are typed into the "Google" search engine and the top 15 results are recorded. As each term generates results these are then tabulated to provide a list of those supplier web sites demonstrating significant visibility. Some of these suppliers were not those provided by the Trade Association and further investigation highlighted OEM product ranges.

Product Targeting - The rating of a motor in terms of its kW power was one of the primary selection parameters when determining the actual application for a motor.

Discussions with industry defined motors as:

- **Low voltage:** 0.75kw – 75kw
- **High voltage:** 75kw +

The legislation points to a regulated range of 0.75kw – 375kw. Furthermore as the kW increases, so does the size and weight of the motor. It was also apparent that as a motors physical size increases they are no longer stock items and appear to be manufactured to order.

As a consequence and given the wide range of motors available, it was concluded that two specific bands of a particular kW power rating would be researched across all suppliers. The bands selected were 30kw (+/- 5) & 15kw (+/- 5), as these were not only commonly available, but satisfied some of the most common applications for electric motors.

In addition to kW, the number of poles required consideration, as the lower the pole count, the greater is the rpm of the motor. The pole selection was initially based on information drawn from a Working Paper produced by the International Energy Agency and titled "Energy-Efficiency Policy Opportunities for Electric-Driven Systems", which suggested 4 pole as the motor of choice for most applications. However a motors nomenclature by virtue of its kW meant that there was some shift within these bands when recording data.

Data Capture - A preliminary trial run was conducted across the identified manufacturers to establish an understanding of the industry and how easily information is conveyed. This then would influence data collection and the number of motors to be targeted and allow for any adjustment of methodology.

6.3 Results: Electric Motors

The full data capture for Electric Motors has for the reasons of impartiality been omitted from this report. However the following illustration provides a summary of the packet frequency by specific PIR packet.

The required packets were numbered 1 to 12, but a few were subdivided into further sub packets, as the specific point within the legislation listed further information. As a consequence this generated a complete packet total of 22. **TABLE.3** below records the count by packet and the percentage against the total of 777 motors recorded.

TABLE.3: PIR record by data packet, frequency and percentage for Electric Motors		
PIR	**Frequency**	**%**
1.1- Nominal Efficiency 50%	596	77
1.2 -Nominal Efficiency 75%	647	83
1.3 - Nominal Efficiency 100%	740	95
2.1- Efficiency Level IE1	296	38
2.2 - Efficiency Level IE2	193	25
2.3 - Efficiency Level IE3	143	18
2.4 - Efficiency Level IE4	60	8
3. - Year of Manufacture	0	0
4.1- Trade mark	777	100
4.2 -Commercial Registration No.	0	0
4.3 - Place of Manufacture	0	0
5 -Product Model No.	416	54
6- No. Of poles	758	98
7 – The Rated Power Rating	777	100
8 – Rated Input Frequency	759	98
9 - Voltage Range	717	92
10- Rated Speed rpm	777	100
11.1- Disassembly information	0	0
11.2- Recycling Information	0	0
11.3- Disposal Information	0	0
12.(I)- Altitudes above sea level	613	79
12.(ii) - Ambient Air Temperatures	759	98
12.(iii) - Water Coolant Temperature	0	0
12.(iv) - Maximum Operating Temperature	735	95
12.(v)- Explosive Atmospheres	0	0
TOTAL	**9763**	

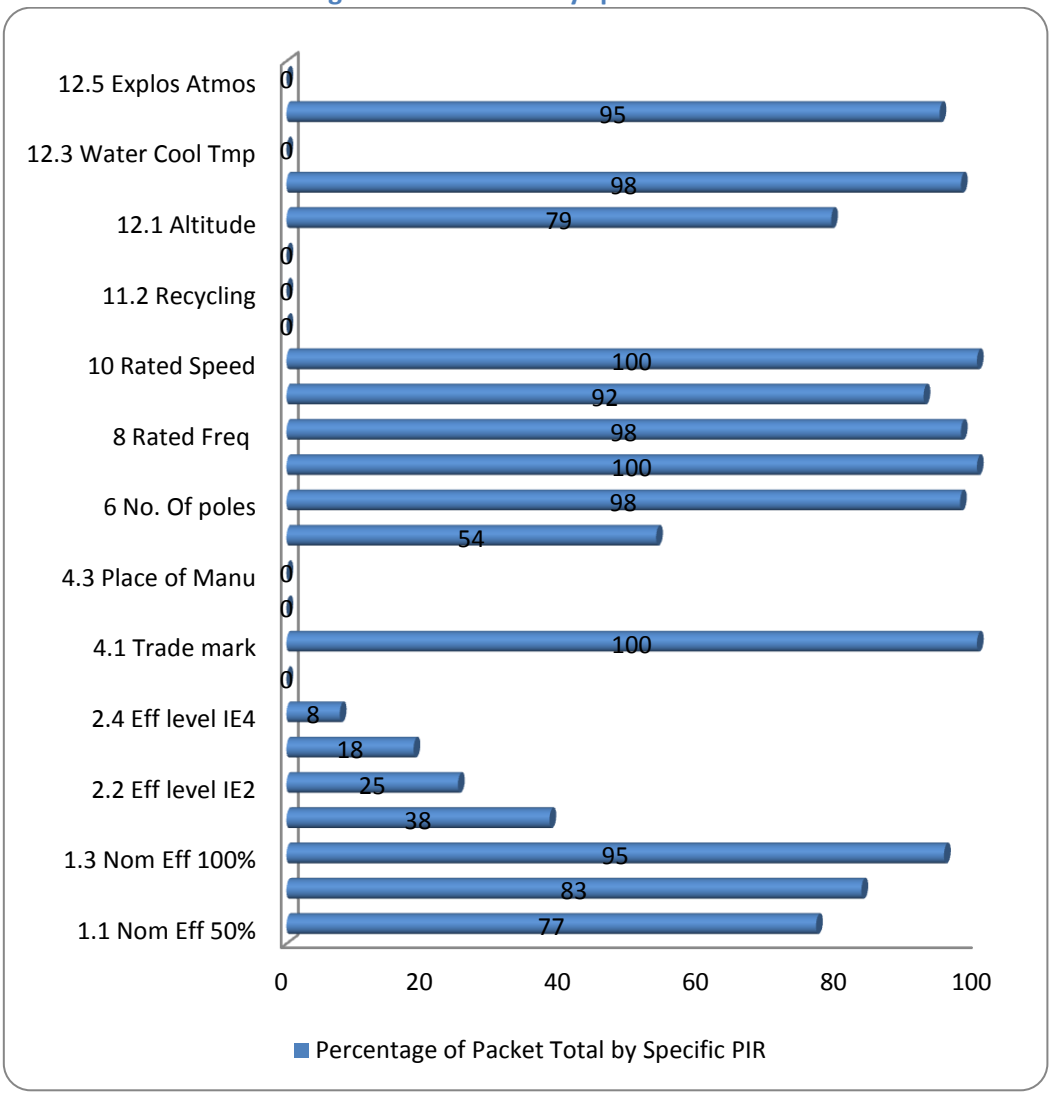
By extrapolating this into **FIGURE.3** below which shows the percentage for each Packet, it is quite evident that not all packets record an entry, most notably Packet 11 which deals with recycling and packet 4 which relates to place of manufacture and the commercial registration number. Recycling which appear to be ignored is relatively important as it is given a particular mention in recital 16 of the Ecodesign Regulations and relates to the potential environmental impact of a product.

Furthermore even though the required information for Packet 2 which relates to the Efficiency Class and which stipulates IE2 and IE3, can be seen to record a combined entry (2.1/2/3/4) of 692 out of a total of 777, it was evident that 286 motors were also recorded demonstrating IE1. The regulations require that from 16th June 2011 that motors shall not be less efficient than IE2 efficiency level. Residual stock is permitted, or if the intention is to not supply within the EU, however as no product had a Packet entry for No.3 "year of manufacturer", it was not possible from the PIR data to establish compliance by way of the date.

Furthermore, although "Packet 2 " makes reference to four efficiency levels, these entries have only been included for the purposes of data collection and will be treated as one packet for the purpose of the Non Compliance Index measure in a later section of the results.

Generally, from the results of **FIGURE.3** below it would appear that the majority of the packets that demonstrate 90% and over completed packets, are those items that provides the technical information about a motor, in terms of a motors; No. of Poles (6), Power Rating (7) , Rated Frequency (8) , Voltage Range (9) and Rated Speed (10).

FIGURE.3: Percentage of Packet Total by specific PIR for Electric Motors



6.4 Discussion: Electric Motors

The background to the survey had at its core a number of desired outcomes;

Identify levels and quality of data provision for Product Information Requirements

The survey recorded 777 electric motors over a predominant power rating of between 11kW and 37Kw spread over 12 Manufacturers and Suppliers of various sizes. The PIR as laid down in the implementing regulations has at its core 12 packets of information that a supplier must provide. However, when each point is looked in detail there are elements that potentially extends this package of 12 to that of 22.

The analysis showed that out of a potential 22 packets of data, the actual was closer to a supplier mean of 10, although some provided 13 & 14 which accounted for 80% of all the total motors recorded. Some of this weighting is attributed to the recording of a prominent manufacturer, although a further two reasonably sized manufacturers performed relatively well with some of the best PIR levels of compliance.

FIGURE.3 above of Percentage packets by specific PIR, does illustrate those PIR packets such as "explosive atmospheres" and "water coolant temperature" are consistently left out by all suppliers, for which they might be a justifiable reason. However it is difficult to determine why "recycling" as a PIR packet lacks inclusion.

A review of **FIGURE.3** above also would seem to suggest that particular PIR packets on their own are scoring well, these are notably those packets of information that provide the technical parameters of the motor, such as the "no. of poles", "voltage rating" and "electrical frequency". What is not achieving similar and comparable 100% levels of inclusion is the "Nominal Efficiency" ratings and to some extent the IE index. This is especially true of those smaller suppliers who are taking advantage of OEM, as it is they who appear to be failing to meet the level that some of the larger organisations are able to provide.

There also seems some absence of continuity by manufacturers as to the PIR provided, in that for motors from the same brand, there were instances of good PIR provision mixed with blank PIR for some motors.

An attempt was made to determine the quality of the PIR that manufacturers were providing, firstly by making a record of the number of key strokes or clicks that was required to locate the PIR and also, and more subjective, the perception of the ease of use and presentation of the web site and how that might have contributed towards making the PIR readily available.

Overall the average number of clicks reported for all manufactures and suppliers from first page of web site was 3, at just over 60%. The next highest level was for 6 clicks at 20%. From this it would appear that 3 clicks is the norm. However, there were situations were clicks greater than 3, the researcher was provided with options to view more detailed information by way of a PDF and although this might have its merits, was very much dependant on the usability of the site.

This draws in the issue as to the Quality of Assistance of a site and it was found that multiple clicks and the extra provision of information did not go hand in hand with a web sites appraisal as to "Very Good", "Good", "Fair" or "Poor".

TABLE.7 Appendix.2 looks at the comparison of Quality of Assistance by key stroke and does suggest that multiple key strokes can be reflective of a cluttered and complicated site. From this data emerges a single manufacturer being the only one of the 12 suppliers to achieve a "Very Good" score and yet still managed to provide PIR within 3 clicks. Also notable was the use by this manufacturer of PDF files which sat with the main information, rather than being accessible by further clicks.

Evaluate comparability of data, i.e. units, scale, testing standards used

The data for Electric Motors is of a relative complex nature in that it applies to the operation of an electrical product which as a piece of equipment has a varied specification depending on the purpose to which the motor is to be applied.

Once an understanding of the legalisation has been grasped, the data provided by the suppliers within their web sites does appear for most part to apply to the terms and units set out with the relevant section of the implementing regulations. However, there were a number of exceptions, notably Point 2.2 of Annex.1 of the Ecodesign Regulations for Electric Motors which specifically makes reference to the requirement as having to be *"Efficiency Level:IE2 or IE3".* However, within the Suppliers Synopsis part of this report (Appendix.2, S10.10) mention is made to instances where the "EFF" standards continued to be given prominence.

Assess how well the product information provided could assist consumers in the purchasing decisions

As previously mentioned the web sites for motors and the information are directed towards an audience that is not intended to be the traditional consumer, but that of someone who is an end user and to have come with some technological knowledge of the product.

Overall out of a potential 22 packets of PIR information, the best performing suppliers were able to provide 14 packets of information. This accounts for all those entries as recorded in **TABLE.3** above**.** However a supplier who only achieves a PIR provision of 5 is obviously disadvantaging the consumer, whether they are technical or not. A typical PIR of 5 only generally provides the name of the manufacturer, model, No. of poles, power rating and rated speed and makes no mention of other packets of information relating to nominal efficiency or IE2 efficiency compliance; the very packets that relate to energy efficiency. Obviously as the PIR packet provision increases by supplier, there is the expectation that the additional information will look to satisfy the requirements of the legislation and the needs of the user and those regulators that have a vested interest in monitoring product efficiencies against Ecodesign.

Influence the Market to improve levels of compliance.

For all the motors recorded the overall level of non compliance was Marginal (MAR), which is mainly attributed to those larger manufacturers who offered a more comprehensive product range. Conversely non compliance was measured at a level that was rated Significant (SIG) and in a few cases Severe (SEV) for those suppliers who are small to medium operations.

Ideally compliance that meets 100% would be the goal, however even the best performers at 12 PIR packets or more, amounting to 40% of those suppliers researched, could only achieve just over 50% compliance. It would seem that there is an intention by the larger manufacturers to comply, as many of their web sites promote energy efficiency and some that even provide a running cost calculator.

Any influence would look to enquire why particular packets of PIR such as recycling are not being met and whether some of the PIR's relevant and can actually be completed. There may well be the perception by the suppliers that compliance has been met somewhere within the website, however the fact that many of the sites require multiple clicks to find the relevant PIR can make finding of the information a challenge, especially if it does not follow the prescribed order as laid down by the regulations.

6.5 Conclusion: Electric Motors

The survey assessed 777 individual Electric Motors online and collected in the region or some 9700 items of data across 12 suppliers of motors, ranging from mainstream manufacturers to a small number of own named OEM suppliers.

The data collected was set against the required PIR which is set out as points within Annex I.2 of the Ecodesign Implementing Regulations for Electric Motors. Within the section is listed 1 to 12 points that the supplier must provide in the order given.

As part of the preliminary review for the survey, the regulations identified a number of points (exp: Packet 1. "Nominal Efficiency at Full, 75% and 50% rated load and voltage") that from the construct of the requirements appeared to extend the eventual PIR provision. This potentially created a PIR requirement of 22 packets of information to require an entry.

From the results it is apparent that for all the motors recorded, the mean number of PIR was found to be 10 across all 12 selected suppliers. Furthermore the maximum number of PIR provided was 14, which are counted for just 25% of all motors.

However, in terms of non compliance overall, motors demonstrate a majority that was considered Marginal (MAR). This therefore appears to suggest that although not ideal, the motor industry with some improvement could see compliance for PIR prevision reach a more Satisfactory (SAT) or ideally 100 percent compliance. However, there is the weak sector of the smaller operators that act as OEM suppliers which with their poor showing detriments those larger manufacturers who have invested resource into ensuring compliance.

Finally, although the information was provided, it was not always easy to find due to the relative complex technical nature of motors and the fact that many manufacturers did not necessarily list the PIR in the required order. Any future investigation would therefore benefit from the introduction of a template that the suppliers could follow and make available within one clickable location.

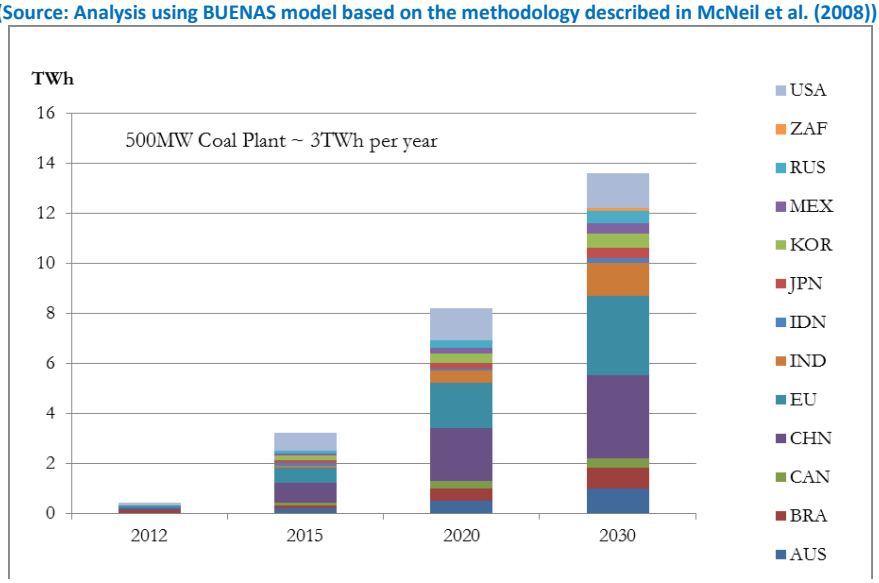
7. Televisions

Currently, Televisions are estimated to represent more than 3% to 4% of global residential electricity consumption (~168 terawatt hours [TWh], representing ~27 megatonnes of CO2 emissions in 2010). As shown in the graph below and in spite of the projected increase in penetration of Television sets in households, especially in emerging economies, Television electricity consumption is expected to slightly decrease in the short term, because of a large-scale technological transition (e.g., CRT to LCD, and CCFL-LCD to LED-LCD) and rapid improvements in Television energy efficiency.

In Europe Televisions contribute to an overall 10% of all electricity use. The present trend in Europeans markets has seen a move away from CRT (Cathode Ray Tube) which have been abandoned almost completely in the European Union and a move toward the more efficient and aesthetic, LCD and Plasma TV's. Technology advances have driven down the energy use of all new TVs by 60% since 2006, leaving a 42-inch LED TV today costing just £14 a year to run compared with around £80 for a plasma screen in 2006. The graph below presents the potential savings which are available if technology manages to maintain the present trend toward energy savings.

Forecast of TV Electricity Savings Potential in Selected Countries

(Source: Analysis using BUENAS model based on the methodology described in McNeil et al. (2008))

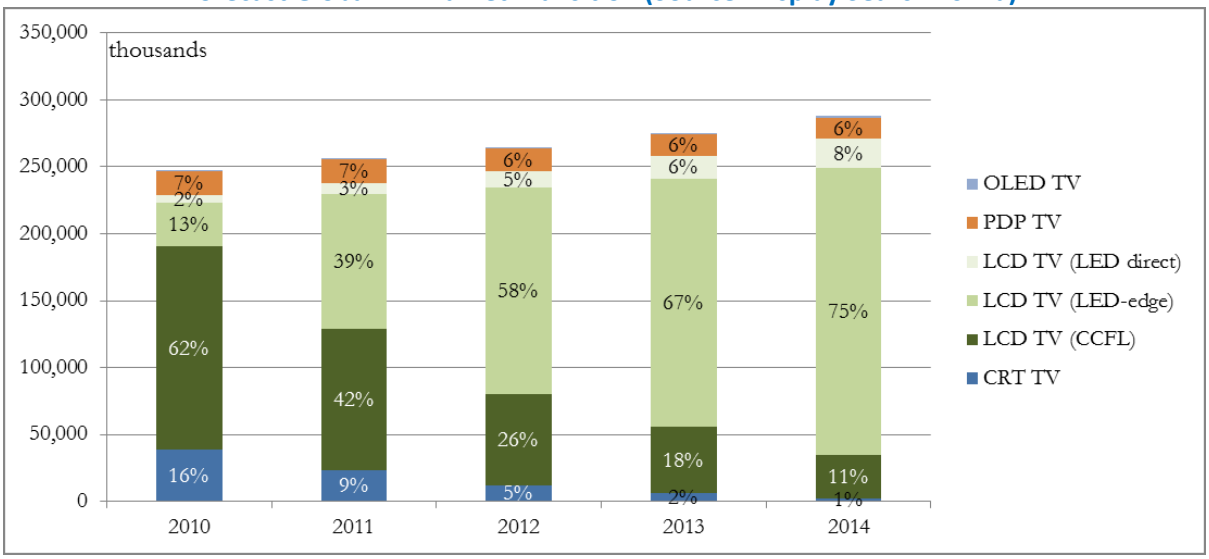


Assuming that the average TV lifetime, including replacement cycles is about 10 years, almost all of the TV electricity consumption in 2030 will be from TVs that are yet to be purchased. This presents a great opportunity to influence these future purchase decisions and save electricity.

- **Display Types**

Since the mid-2000s, the global TV market has undergone a major transition from traditional cathode ray tube (CRT) TVs to other types, particularly flat panel display (FPD) TVs such as LCD and plasma. LCD TVs accounted for more than 90% of the global TV market through 2012, including all screen sizes **(Display Search 2011a)**. Although CRT TVs are expected to remain popular in emerging markets, major TV brands are likely to provide to the market more affordable LCD TVs to replace CRT TVs in such markets. In addition, a large-scale transition is expected from conventional cold cathode fluorescent lamp (CCFL) backlit LCD TVs, to light-emitting diode (LED) backlit LCD TVs for all screen sizes, resulting in substantial improvements in efficiency. The graph below shows the predicted market transition from CRT to LCD, and CCFL-LCD to LED-LCD TVs.

Forecast Global TV Market Transition (Source: Display Search 2011a)



The 'LED TVs', which use light-emitting diodes, only began to appear in significant numbers around 2009. As well as using less energy, the sets are thinner, provide improved visual rendition and are becoming increasingly popular with buyers, accounting for the majority of LCD TV sales as the products become more mainstream and replace CCFL illuminated panels.

Energy efficiency savings from newer televisions are also likely to be offset by the fact the average consumer is expected to own more of them, with forecast of an average 2.6 per home by 2020, up from 2.4 today. It is therefore for this reason that consumers should have at hand the necessary information to make an informed choice when selecting a new TV. There is often the perception that;

- The electricity consumption of TV's has not been a decisive factor for the purchasing decision of consumers,
- Information on electricity consumption , actual running cost and potential electricity savings available has not been easily accessed or understood,
- Few incentives have existed in the past for manufacturers to optimise the energy savings.

However, the Ecodesign Regulations for Televisions and its associated Product Information Requirements (PIR), are part of that mandatory requirement placed on manufacturers to ensure they position on the market products that are efficient and environmentally friendly, as well as to provide the consumer with the means to contribute and by their purchasing power, be influenced by that efficiency.

7.1 Product Specific Methodology: Televisions

7.1.1 Legislation

Televisions are covered by implementing regulations No 642/2009 with regard to Ecodesign Requirements for Televisions.

Televisions fall under the following;

1. 'Television' means a television set or a television monitor;

2. 'Television set' means a product designed primarily for the display and reception of audiovisual signals which is placed on the market under one model or system designation, and which consists of:

(a) a display;

(b) one or more tuner(s)/receiver(s) and optional additional functions for data storage and/or display such as digital versatile disc (DVD), hard disk drive (HDD) or videocassette recorder (VCR), either in a single unit combined with the display, or in one or more separate units; 3. 'television monitor' means a product designed to display on an integrated screen a video signal from a variety of sources, including television broadcast signals, which optionally controls and reproduces audio signals from an external source device, which is linked through standardised video signal paths including cinch (component, composite), SCART, HDMI, and future wireless standards (but excluding non-standardised video signal paths like DVI and SDI), but cannot receive and process broadcast signals;

Where the regulations define the following:

- "home-mode" means the television setting which is recommended by the manufacturer for normal home use;
- "on-mode" means the condition where the television is connected to the mains power source and produces sound and picture;
- "standby-mode(s)" means a condition where the equipment is connected to the mains power source, depends on energy input from the mains power source to function properly and offers the following functions only, which may persist for an indefinite time:
    — Reactivation function, or reactivation function and only an indication of enabled reactivation function, and/or,
    — Information or status display;
- "forced menu" means a set of television settings pre-defined by the manufacturer, of which the user of the television must select a particular setting upon initial start-up of the television

7.1.2 Product Information Requirements

The Ecodesign Regulations for Televisions sets out at Annex. I section 5.2 the PIR requirements, which reads:

> *From 20 August 2010:*
> *The following information shall be made publicly available on free-access websites:*

— The on-mode power consumption data in Watts rounded to the first decimal place for power measurements up to 100 Watts, and to the first integer for power measurements above 100 Watts,

— For each standby and/or off-mode, the power consumption data in Watts rounded to the second decimal place,

— For televisions without forced menu: the ratio of the peak luminance of the on-mode condition of the television as delivered by the manufacturer and the peak luminance of the brightest on-mode condition provided by the television, expressed in percentage, rounded to the nearest integer,

— For televisions with a forced menu: the ratio of the peak luminance of the home-mode condition and the peak luminance of the brightest on-mode condition provided by the television, expressed in percentage, rounded to the nearest integer,

— If the television contains mercury or lead: the content as X, X mg and the presence of lead.

7.2 Survey Preliminaries: Televisions

Legislation – Compared to Lamps and Motors, Televisions present a more simplified list of PIR's which are required to be made available on free access web sites. What appears to be 5 packages increases with the inclusion of "and/or" within the PIR requirements.

Trade Associations – referral was made to the Trade Association "Intellect" and "Digital Europe" which provided a list of manufacturers known to demonstrate a significant presence within the UK. They were notably:

- Samsung
- Lg
- Panasonic
- Sony
- Toshiba
- TP Vision (Phillips)
- Hitachi

Preparatory Research – Preliminary investigation of TV supplier websites highlighted a product that predominantly fell within the three main technology types,

- **LCD (CFL):** Liquid Crystal Display TV screens come to life when light from fluorescent tubes behind and around the edge of the screen is shone through the television screen's matrix of tiny coloured liquid crystal cells. Signals control each cell, letting varying amounts of colour through, and a picture is built up.

- **LED LCD:** Light Emitting Diode LCD technology, refers to the backlight illumination system used in more modern LCD Televisions and not the technology that creates the picture. LED TVs are still basically LCD TVs. It is just that these new sets use LED backlights behind the panel rather than the florescent-type backlights used in most other LCD TVs. There are two different types of LED backlight, Edge LED and Direct LED. Edge LED backlighting technology has LED lights around the perimeter of the panel's frame. Because the LEDs aren't spread across the entire panel, manufacturers can achieve an ultra slim design of under 3cm. Backlight LED is starting to replace CFL as not only is the picture of better quality, but that LED also comes with improved energy efficiencies and thinner dimensions.

- **Plasma :** A plasma TV emits its own light, unlike LCD TVs. The picture is produced by thousands of pixels filled with a mixture of phosphor and gas so that when stimulated by electricity, creates its own light. As a result the picture can demonstrate deeper black and colour saturation, however this offset by the fact that they are not as efficient as LCD panels, especially those with LED illumination. They are also slightly deeper to accommodate the technology. The demand for picture quality has the manufacturers who continue to market Plasma, striving to make improvements towards energy consumption and modern plasmas are not only more efficient, but are becoming thinner.

- For each group there was also a considerable variation in sizes which did follow a pattern between suppliers as to the dimensions in inches. Furthermore the presentation was of a more familiar product, within web sites that were tuned for a retail consumer audience.

Risk Analysis – From the preliminary research and Trade Associations data, focus was placed on those particular sectors of the market that were considered to have an overall influence on the UK market. Requests were made of the Trade Associations for details of market penetration by supplier, however such information was conveyed as being unavailable unless direct contact was made with the manufacturer.

The decision was therefore made to concentrate data gathering in the first instance on recognised TV suppliers and then move the focus toward those familiar retailers and supermarkets who marketed own branded products. Finally a number of smaller more specialist suppliers were also identified and recorded.

Product Targeting – It was decided to focus product targeting on the main stream technologies of LCD (CFL), LCD (LED) and Plasma. The presence of CRT as a category was ignored as it no longer featured as a readily available product within the UK market and was considered unable to meet the requirements of the Ecodesign Regulations. Finally, recorded TV's would be grouped into the particular TV sizes;

- Small = 0 – 29"
- Medium = 30 – 41"
- Large = 42" – 60+"

7.3 Results: Televisions

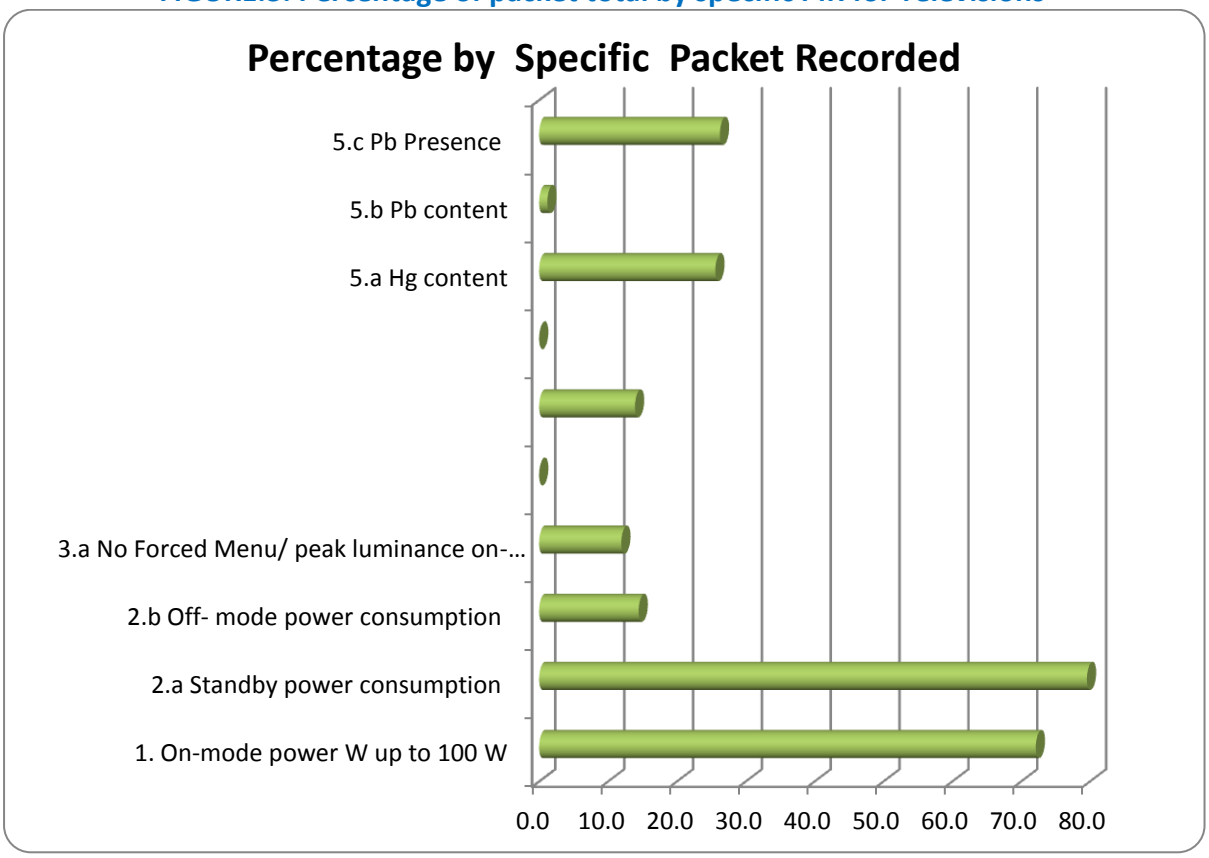
The full data capture for Televisions has for the reasons of impartiality been omitted from this report. However the following Table and Graph has been lifted from the results and provides a summary of the packet frequency by specific PIR packet.

From the Ecodesign Regulations for TVs there is at Annex I, 5.2 a number of points stated under the heading *"the following information shall be made on available on free access websites".* The information points are listed as five sentences, however within these sentences the actual requirements can by interpretation be broken down into potentially 10 packets that require review. These 10 were recorded as part of the survey and amounted to 1848 entries. However, for actual compliance this figure reduces to 7 as some of the questions offer choices ("forced or non-forced menu") and ask the question "if" (which refers to "lead and mercury" content).

From **FIGURE.3** below it can be seen of the PIR required, that the "online power" and "standby power" are the most frequent at more than 70%, whereas "forced" and the "non-forced menu" for peak luminance were only 10%. "Mercury content" and the "presence of lead" were just above 20%. It would be of interest to see whether all LCD TVs with CFL tubes make mention to mercury content.

TABLE.3: PIR Recorded by data packet, Frequency & Percentage for Televisions		
PIR	**Frequency**	**Percentage**
(1) 1. On-mode power W up to 100 W	544	72.1
(2) 2.a Standby power consumption	600	79.6
(3)2.b Off- mode power consumption	109	14.5
(4)3.a No Forced Menu/ peak luminance on-mode for TV	90	11.9
(5)3.b. No Forced Menu/ peak luminance of the brightest on-mode.	0	0.0
(6)4.a Forced Menu/ peak luminance home-mode condition	105	13.9
(7)4.b Forced Menu/ peak luminance of the brightest on-mode condition	0	0.0
(8)5.a Hg (mercury) content	193	25.6
(9)5.b Pb (lead) content	9	1.2
(10) 5.c Pb (lead) Presence	198	26.3
	1848	

FIGURE.3: Percentage of packet total by specific PIR for Televisions



7.4 Discussion: Televisions

The back ground to the survey had at its core a number of desired outcomes;

Identify levels and quality of data provision for PIR.

The Television Survey recorded a total 1848 data packets over 754 products, spread over 24 suppliers of which about 30% were online Retailers offering own branded (OEM) items, while the remaining 70% consisted of some of the more well known and established TV Manufacturers and a number of lower volume suppliers. The televisions were selected by way of CFL- LCD, LED-LCD and plasma over the size small, medium and large. Overall this gave rise to data capture in excess of 1800 bits of information relating to PIR.

Annex I, section 5.2 of the implementing Ecodesign Regulations for TVs and the required PIR, makes mention to 5 points of information and states *"the following information shall be made publicly available on free access website".* When the five points are reviewed they include a number of choices that potentially creates 10 packets of information, which h depending on the product specifications can be recorded.

When these results are reviewed the 10 packets were analysed to give a representative 7 packets of PIR information that particular product should have when the likes of "forced/non-forced" and "mercury /lead" content are considered. Overall level of potential compliance sees peak recorded PIR at one, two and five, with a mean of 2.5 across all products.

From **FIGURE.3** above can be seen that the PIR data most likely to be recorded is that of "standby power consumption" and "on mode power". However it is subjective whether the information is actually available with the intention of satisfying the requirements of PIR.

Furthermore there appears to some degree of inconsistency between products from the same supplier, with one particular large manufacturer ranging from no PIR data to 2. It therefore appears that there might be some effort to comply, but at the effort is rather half-hearted.

However, there are conversely a number of examples where the suppliers appear to be able to provide the necessary information with 25% of suppliers recording packet data of five and above. Finally, the level of data by supplier appears to be the same across both Manufacturers and Retailers and presents the picture of legislation that is not being fully embraced by way of the requirements of PIR. In fairness many of the Manufacturers make reference to the green agenda and energy efficiency; however the necessary PIR information is lacking to be able to substantiate the Ecodesign validity of such claims.

Quality of data was assessed by way of the number of clicks to access the necessary PIR and scoring for Quality of Assistance on a supplies website, and the accessibility of the PIR.

Generally the PIR from many suppliers were three clicks and did not appear to demonstrate any correlation as to whether the website was "Very Good" or "Poor". However the overall impression bar a few good examples was of websites that were "Poor" when looking to address PIR. Many of the sites took advantage of PDFs to make the information available, however only a few made the information clear and distinct.

There were a number of "Very Good" sites, but these only amounted to only 16% of all the Suppliers. Finally, the PIR points within the Ecodesign legislation make reference to integers and

decimal points, however from what was observed and the way the data was recorded did not give a convincing picture of whether units were being followed as required by the regulations.

Evaluate Comparability of Data

The survey showed that PIR data was not always located within the same place within a particular Suppliers website. Obviously Suppliers will have their own house styles and different approaches to presentation. It was therefore the case that unless, as was the case for few supplies, the PIR was deposited in a dedicated PDF, then the selection of the required PIR if present at all, could be a challenging task.

There were instances where a Supplier included the actual TV label as part of a website and it was not clear whether this was to assist consumers or an attempt to satisfy PIR, or both. In addition where apparent PIR data was available, it was not always clear as to what the figure referred. One such example was the "on mode" power consumption, where it was not clear as to whether the value required is for the "energy saving mode" or "typical power consumption".

The data also demonstrated inconsistencies between supplies and products, with many suppliers presenting a range of PIR packets submitted, rather than a uniform approach to PIR.

Assess how well the product information provided could assist in the purchasing decisions.

There are potentially, an accountable 7 PIR that are required by the implementing Ecodesign regulations for TVs. These detailed the various power consumptions, peak luminaries and Mercury and Lead content of the TV. Compared to the PIR requirements for electric motors and non-directional lamps the content of the TVs PIR is not so complex and has the potential to be understood by the average consumer.

The survey also shows that the "online power consumption" (1) and standby power consumption (2) are those PIR that appear to be available for the majority of products at around 70%. The remaining information concerning "forced menus" and "disposal" accounted only for about 13% of recorded TVs.

If the intention of the PIR is to assist consumers then at the present levels of provision it would appear to not be delivered. Furthermore its use as an assist to consumers is dependent on how easy it is to find on a particular website. Many of the better suppliers provided all the information as part of a PDF, however the majority presented a less structured approach with PIR information not so clearly defined.

Influence the market to improve levels of compliance.

From the results of the Non Compliance Index the overall picture reflects a very poor level of compliance towards the PIR provision. At the present levels with only two out of the potential seven packets of information being provided by the majority of suppliers, would seem to handicap the use of PIR as a tool to gauge present levels of energy efficiency and influence improvements within the market.

There are a handful of supplies who have made encouraging steps toward making the PIR readily available which would suggest that healthy levels of compliance is achievable. The ideal would be to take advantage of these first steps towards compliance by a few and use them as champions as to

what can be achieved by others, so as to ensure a fair and level approach within the supply sector the TVs.

7.5 Conclusion: Televisions

The purpose of Ecodesign is to ensure that electrical products such as TVs which enter the EU market, meet particular energy efficient requirements and demonstrate improvements toward energy usage. Part of that delivery process is the PIR within the implementing regulations, which provides for the easy comparisons of products by way of their performance against the number of listed PIR requirements.

However, the survey in terms of Televisions clearly demonstrates that the majority of suppliers apart from a handful, are not providing the information to satisfy the implementing regulations requirements. As a consequence, this places a detriment on the consumer , while conversely compromising monitoring by those regulatory bodies that are responsible for the Ecodesign requirements.

The PIR information for TVs consist of 7 packets of information which provides comparative performance data on a particular product. A number of suppliers have successfully provided the information, but this is only a minority. The intention should now be to encourage compliance which is consistent not only between suppliers, but also across the supplier's products.

8. Final Conclusion and Recommendations: All Products

The survey was tasked to review by way of the Ecodesign Framework, three distinct products which are regulated by implementing regulations requiring suppliers who place such products on the market, to provide Product Information Requirements when conducting distant selling.

Over a period of three months, the three products groups Non Directional lamps, Electric Motors and Televisions were researched to identify products and suppliers and then surveyed for on line selling, and the data captured against the listed PIR as required by each of the product specific implementing regulations.

The overall consolidated results are recorded in **TABLE.11A** below and clearly show that Televisions provide the lowest level of the required packet items for PIR, compared to Lamps and Electric Motors. However, when all three product packet items that are required for PIR are compared with the mean of mean PIR by supplier, is then calculated as a percentage, it is apparent that Electric Motors are compliant by an estimated 47%, compared to Televisions at 36% and Non Directional Lamps at around 42%.

TABLE.11A: Total Data and PIR Summary for TV's, Electric Motors and Non Directional Lamps

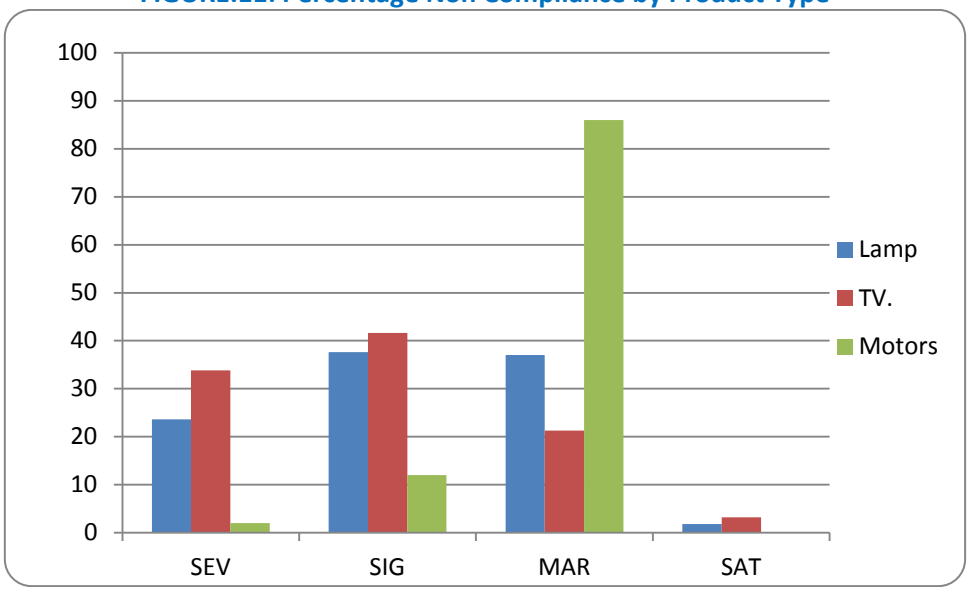
	Total Products	Total Suppliers	Recorded Data packets	PIR Required	Mean of Mean PIR by Supplier	Mean of Mean PIR as %'age of PIR Required
Non Direct' Lamps	611	21	6515	23	9.6	**42**
Televisions	754	24	1848	7	2.5	**36**
Electric Motors	777	12	9763	22	10.3	**47**
	2142	**57**	**18126**	**17.3**	**8.0**	**42**

This would seem to suggest, that although the PIR requirement for Televisions is fewer in number, by a count of 12, it does not appear to follow that this makes the product type more likely to satisfy compliance. When the calculation of Non Compliance Index is compared between the three products **FIGURE.11B** below, it again substantiates the previous findings that sees Televisions and Non Directional Lamps positioned at the Severe (SEV) and Significant (SIG) non compliant end of the scale, compared to the Electric Motors which resides predominantly within the Marginal (MAR) camp for Non Compliance.

TABLE.11B: Percentage Non Compliance by Product Type.

Product	Severe (SEV)	Significant (SIG)	Marginal (MAR)	Satisfactory (SAT)
Non Dir' Lamps	24	38	37	2
Televisions	34	42	21	3
Electric Motors	2	12	86	0

FIGURE.11: Percentage Non Compliance by Product Type



The legislative expectation is for full compliance and for all three products there were recorded some welcomed examples of suppliers who had made substantial efforts towards delivery of the required PIR. However, it is clear that the data presently provided by suppliers is not going fully to deliver the intended purpose of the Product Information Requirements. As a consequence the use of PIR is unable to provide the necessary data that should support;

- Comparability of data.
- To influence the market to improve levels of compliance.
- To assist users and consumers in purchasing decisions.
- To monitor Environmental Impact

From having established that there appears from the data a poor take up of PIR, there is now a need to explore those initiatives and supplier engagements that would look to be resourced to improve compliance and ensure that those Suppliers presently implementing best efforts are not disadvantaged by those other organisations that are not so committed or embracing of compliance against PIR.

The survey as it stands only provides a record of what PIR packets were available by product and supplier, and although a number of pertinent points were captured within the Supplier Synopsis for each product, there is insufficient secondary data to establish actual cause for the non compliance across the surveyed groups.

However, when reviewing PIR packets and how supplier values for PIR were expressed, it became apparent that there were some instances of confusion as to what data the suppliers were presenting, A notable example is that of Non Directional Lamps and reference to such term as “nominal” or “rated”, and how often it was not clear as to what a particular listed figure referred.

The often haphazard delivery on a number of websites of the required information, did give rise to the postulation as to whether a template for PIR delivery, might assist those who are regulated to provide the data, and ensure that all the required information is made available and accounted for.

The advantage of good PIR information is that the market surveillance authorities and regulators can make use of it in supporting regulatory frameworks, however poor or difficult access to information, as discovered by this survey would conversely limits its value to regulators. Suppliers therefore need to be influenced and encouraged to comply with the requirements laid out in the implementing regulations so that the intentions of the Ecodesign Framework has the means to be monitored and that innovation and product efficiency are seen to be delivered.