Technical assistance study for the assessment of the feasibility of using "points system" methods in the implementation of Ecodesign Directive (2009/125/EC)

TASK 3

Method development

Final report

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Glossary

Term	Definition
Complex product	No single definition (see section 3.2) but may have any of the following characteristics: • does not provide a standard configuration / functional unit • may have multiple functions • may be modular • is often a customised product, adapted to a specific application • can be finally installed at the user's site, *and/or* • can have different performance levels dependent on the operating conditions at the user's site • can have functional parameters that are inherently difficult to measure
Components and sub-assemblies	parts intended to be incorporated into products which are not placed on the market and/or put into service as individual parts for end-users or the environmental performance of which cannot be assessed independently
DSD	data storage device
Duty profile	fraction of time a product, extended product or product system, spends spent at each operating point during the total operating time or a complete cycle of operation
Ecological profile	applicable to the product, of the inputs and outputs (such as materials, emissions and waste) associated with a product throughout its life cycle which are significant from the point of view of its environmental impact and are expressed in physical quantities that can be measured
Ecodesign requirement	any requirement in relation to a product, or the design of a product, intended to improve its environmental performance, or any requirement for the supply of information with regard to the environmental aspects of a product
Energy Efficiency Index (EEI)	a value describing the energy efficiency performance of a product, extended product or product system as used in a given application
Environmental impact	any change to the environment wholly or partially resulting from a product during its life cycle
Extended Product	within the MEErP an extended product is when the scope of the product or component boundary is extended to take into account the effect of related components and controls that influence real-life use: e.g. include part loads, misc. operating modes, frequency of use, and power management settings or controls
Extended Product Approach	methodology to determine the energy efficiency index (EEI) of the extended product (EP) using the duty profile of the application and taking into account the effect of power management or controls[1]

[1] Note – the extended product approach has been used in at least one Ecodesign regulation e.g. for circulators, covered by Regulation 641/2009 (OJ L 23.7.2009, p. 35), amended by Regulation 622/2012 (OJ L 180, 12.7.2012, p. 4) and is proposed in the working document to amend the fan regulation (WORKING DOCUMENT - DRAFT

Generic Ecodesign requirement	any Ecodesign requirement based on the ecological profile as a whole of a product without set limit values for particular environmental aspects
Harmonised standard	a technical specification adopted by a recognised standards body under a mandate from the Commission, in accordance with the procedure laid down in Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations, for the purpose of establishing a European requirement, compliance with which is not compulsory
Implementing measure	measures adopted pursuant to the Ecodesign Directive (European Commission 2009) laying down Ecodesign requirements for defined products or for environmental aspects thereof
LCA	life cycle assessment
Life cycle	the consecutive and interlinked stages of a product from raw material use to final disposal
Material efficiency	material efficiency can be understood as "doing more with less". However, there are a number of aspects regarding material consumption and its environmental, economic and social impacts that it is difficult to give a single definition that would comprise all nuances
MEErP	Methodology for the Ecodesign of Energy-related Products
MT	machine tool
Placing on the market	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
Product design	the set of processes that transform legal, technical, safety, functional, market or other requirements to be met by a product into the technical specification for that product
Putting into service	the first use of a product for its intended purpose by an end-user in the Community
Product module	a module with a product or extended product
Product system	the product or extended product and its impact on the wider system it operates within
Strict product	within the MEErP the strict product, or component, scope considers a product is operated at a steady state, under a nominal load
Specific Ecodesign requirement	a quantified and measurable Ecodesign requirement relating to a particular environmental aspect of a product, such as energy consumption during use, calculated for a given unit of output performance

ECODESIGN REGULATION Review of Regulation 327/2011). It is also covered in harmonised standards such as EN 50598-1:2014 Ecodesign for power drive systems, motor starters, power electronics & their driven applications - Part 1: General requirements for setting energy efficiency standards for power driven equipment using the extended product approach (EPA), and semi analytic model (SAM). See also Europump (2013).

1. Introduction

This report sets out issues and considerations that should be taken into account when devising any proposed points-system methodology(ies) to be used for the Ecodesign assessment of complex products. Section 2 is a primer that provides some background to the project. Section 3 sets out a summary of findings from the stakeholder consultation efforts conducted in Task 2 (VITO *et al* 2016) and their implications for the methodology focus and development. Section 4 sets out the various factors that need to be considered when developing a points-system methodology. Section 5 presents the methodology to be followed to consider, and potentially derive, an Ecodesign points system based on the findings of section 3 and 4. Section 6 considers linkages between the proposed methodology and the MEErP and Ecodesign/labelling regulatory approaches. Section 7 provides observations on the implications of the methodology for conformity assessment and section 8 summarises and clarifies the rationale behind the proposed methodology.

Lastly, Task 4 of this study, which is addressed in a separate report, considers the application of this methodological approach to the development of a points system for two case studies: a) machine tools and b) data storage units. This is intended to test the applicability of the methodology in two concrete cases but is done for illustrative purposes only. Thus, these case studies are simply intended to explore to what extent it is viable to apply the proposed methodology to these illustrative product groups. The results are not intended to constitute a proposal for a specific points system for these products to be applied directly within Ecodesign regulatory requirements.

2. Background

This section provides background necessary to understand the context behind the development of this concept note.

The European Commission has instigated this technical assistance project to evaluate and derive a "points-system" methodology that could be applied to the development of Ecodesign requirements for complex products and/ or product systems. This need arises due to the increasingly common investigation of more complex energy-related products and systems for prospective Ecodesign and Energy Labelling implementing measures within the Ecodesign work plan, most notably since the advent of the 2012-2014 Ecodesign work plan. Some examples of such products are:

- machine tools
- data storage devices
- professional washing machines/ driers,

which are complex in that:

- they may have more than one functional unit (i.e. the quantified performance of a product system for use as a reference unit in a life cycle assessment study), due to the variety of functions the product is capable of performing,
- the functional units may be inherently difficult to assess due to measurement or methodological difficulties.

It is also common for the product groups concerned to have varying degrees of heterogeneity that complicate their assessment against common metrics and measurement methods. However, as savings potentials from the adoption of

appropriate Ecodesign technologies can be significant, and these technologies are theoretically capable of being assessed on a modular basis, the European Commission is interested in evaluating whether it is feasible to devise an assessment methodology for product systems comprised of technology/design modules that considers the ensemble of modular technologies deployed.

This notion was first explored within the Ecodesign process in the case of machine tools within a working document put forward by the Commission at the May 2014 Consultation Forum which proposed one potential option based around a points systems approach (European Commission 2014). The resulting discussion highlighted the potential of this notion but also the need to explore options in greater depth and to produce a rationale that would allow the viable approaches to be identified and their strengths and limitations to be assessed. The present technical support services contract, under which the current work is conducted, aims to elucidate this issue via the conduct of analyses that will clarify the options, identify the most promising method(s) and then demonstrate their viability via some worked case studies.

To be able to fulfil the specific objectives of the project, the study approach and methodology is structured into five tasks as follows:

Task 1 - Stakeholder consultation, including the compilation of a stakeholder list and a stakeholder survey.

Task 2 - Review of state-of-the-art methods, in which relevant existing methodologies will be catalogued and reviewed, followed by a comparative analysis.

Task 3 - Method development, which entails the derivation of a prospective method for establishing Ecodesign requirements for complex products. This is to be derived from consideration of at least: a) the fit with MEErP, b) the fit with the provisions of the Ecodesign Directive, c) suitability for addressing energy-related and resource efficiency aspects, d) modular build on existing Ecodesign implementing measures, e) measurability via standards.

Task 4 - Case studies, where at least two product groups will be evaluated using the method proposed in Task 3. The Task 3 method may be iteratively revised and applied, as appropriate.

Task 5 – Reporting

The study is being carried out by a consortium that spans a broad spectrum of expertise including technological know-how and environmental engineering, economic and environmental assessment, market and consumer analysis. It comprises Waide Strategic Efficiency as the technical leader of the study with the other involved project partners being VITO, Fraunhofer, Viegand Maagøe and VHK.

3. Findings from stakeholder consultation

The discussion with stakeholders both via the 1st Stakeholder meeting held in Brussels on 30th June 2016 and the Member State survey led to two sets of findings and conclusions, which will be discussed in the following sections.

3.1 Overall Comments on a "Points-System" Approach

The overview comments from the 1st Stakeholder Meeting, considered together with the previous Member States' feedback, may be summarised by the following representative bullet points:

- There is support for, or at least openness to, the use of a points-based approach to setting Ecodesign requirements for products that cannot otherwise be treated within a conventional Ecodesign framework.

- Clarifying the circumstances of when a conventional Ecodesign approach is no longer sufficient is likely to be necessary before a points-system approach would be considered for any specific product; however, this may not be straightforward. Stakeholders have indicated that guidelines of when it would, and when it would not be, appropriate to derive a point-system approach would be welcome i.e. to establish a non-binding set of considerations that would determine whether development of a points-based approach might be justifiable for a given product.

- Product complexity is not very straightforward to define but it is helpful to examine what it involves. Many stakeholders provided insights into this aspect which are further elaborated in the following section.

- Numerous stakeholders advised that the points-based approach considered in this study should limit the number of environmental impact parameters it attempts to address. Advice was given for either the project activities to be focused exclusively on energy in use, or alternatively to consider no more than one or two other environmental impact parameters, of which material efficiency was the most commonly cited additional parameter.

- Most stakeholders felt it was premature to attempt to devise weightings that are applicable across different types of environmental impact categories. This is because they felt there was unlikely to be any consensus on what the relative weightings to be given to different environmental impact categories should be.

- There was a clear preference for panel-based methods to determine weightings and weighting approach if these were to be attempted. However, stakeholders indicated that this needed to be manageable within an Ecodesign regulatory framework. Note these weightings could be applied to derive an overall score within an impact criterion (such as energy performance) and hence weightings per se are not inconsistent with the preceding point.

- There was a desire for a rational analytical framework to be established to help derive weightings and the points-structures.

- There was considerable scepticism about the current viability of methods that involved full life cycle assessments due to the immaturity of data, lack of practical means of verifying claims, lack of consensus on approaches and difficulty in comparing across inherently different impact parameters.

- Stakeholders indicated that points-system approaches could be suited to the establishment of both generic and specific Ecodesign requirements and

indeed could potentially provide a hybrid approach that spans both aspects i.e. a type of third approach.

- Pragmatic considerations will be paramount when determining the viability of any method.

The methodological framework proposed in this report is guided by the above responses, regarding the overall approach and with regard to product complexity considerations. It is important to reflect on the stakeholder feedback received, both when determining under what circumstances a points-system should be considered, and in assessing how it should be structured. It is also vitally important to appreciate that this guidance has strong implications for the methodology proposed, most notably in removing from consideration points systems approaches that aim to apply value judgements across inherently different parameters (such as the various environmental impact parameters).

3.2 Product complexity

Building on the above remarks, we also need to consider: In what way might a product be complex?

These are the comments received from the stakeholder consultation process that addressed this question:

"A complex product:
- does not provide a standard configuration / functional unit
- can have multiple functions,
- can be modular,
- is often a customised product, adapted to a specific application,
- can be finally installed at the user's site,

and/or

- can have different performance levels dependent on the operating conditions at the user's site
- can have functional parameters that are inherently difficult to measure."

"The definition of a complex product needs to be clearly distinguished from an extended product."

"A product that has one or more of the following characteristics:
- Product / system with more than one function (machine tools, washer driers)
- The performance is too dependent on the duty cycle (pumps, motors)
- Heterogeneous types of products (machine tools)
- Custom-made products/systems/installations (machine tools, steam boilers, industrial ovens, large ventilation units, large boilers and heat-pumps, large chillers/heat-pumps)"

"Usually they are typically construction products that have to be installed, and products systems e.g. business to business and data centres (enterprise servers), consumer electronics, and large professional products and tertiary lighting products."

"When products are not sold as packages but as components"

"A complex product is a collection of various parts (modules) that can be assessed separately, that allow for a large number of combinations where each combination of modules constitutes a product that has different functionalities/performances (to suit different needs of end-users).

Note: differentiation between modules could be done by software i.e. potentially diagnostic software could be applied to assess the functionalities and energy/resource efficiency of specific modules in each functional mode and to determine the apportionment of effort/time in each mode."

Some further comments:

1. "A product that can be used in various ways (for which different user profiles exist) need not be a complex product."
2. "A large product need not be a complex product. Transformers can be very large but they are not complex products in the above definition."
3. "A points-system can be oriented on functionalities/performance/efficiency but also on savings options"

4. Factors to consider

This section sets out the factors that will need consideration in the design of points system approach(es).

4.1 Implications of product complexity and under what circumstance does complexity become the rationale to use a points approach?

The response to this question is not automatically self-evident. Just because a product is complex from an Ecodesign regulatory perspective it doesn't necessarily follow that it is more appropriate to use a points-system approach than a conventional regulatory approach.

It could be said that a points-system approach might be considered when there is a degree of doubt about the ecodesign performance assessment because:

a) there is a mix of quantifiable and more qualitative product ecodesign features yet it is necessary to also ascribe some value to the qualitative features because these are expected to bring ecodesign benefits
b) although the presence of specific ecodesign features is known to bring ecodesign benefits, the relative importance of the benefit to a given ecodesign performance parameter is difficult to determine in a reliable manner at the level at which the scope of a prospective regulation would apply (see cardinal and ordinal impact parameters discussion below)
c) it is too complex to apply a rigorous performance assessment method in practice but a points-based approach, which awards points depending on the ecodesign features used, could provide an acceptable compromise that allows requirements to be set that encourage progress in a positive direction without being overly constraining.

Responses from stakeholders have been synthesised in Table 1, together with comments on the implication of the complexity aspect to the development of

Ecodesign (ED) requirements which might be added. Note that the table also includes a provisional and incomplete assessment of whether each complexity feature applies to the two product case studies to be assessed in Task 4 (data storage devices (DSDs) and machine tools (MTs)) or not.

Table 1 also attempts to summarise the stakeholder feedback into types of complexity features, and describes the possible implications associated to each feature. In addition, the three aspects of (a), (b) and (c) referred to above are tentatively mapped across to each complexity feature.

Table 1: Implications of product complexity features and examples data storage devices (DSDs) and machine tools (MTs).

Complexity feature	Implication	DSDs	MTs	Type of uncertainty involved
Has a standard configuration	Likely to increase homogeneity and hence ability to normalise product performance for functionality. This increases prospect of being able to set ED requirements on products which are independent of application and hence can be applied at the factory gate.	Often	Only for some types	a
Has a clear functional unit	Increases viability of using a standard ED approach where product performance is normalised for functionality.	Often	Not always	b, c
Has multiple functions	Adds complexity when aiming to use a standard ED approach wherein product performance is normalised for functionality.	Partly	Often	b, c
May be modular	May permit module-level ED specifications	Y	Y	a, b, c
May be a customised product, adapted to a specific application	Affects heterogeneity and hence ability to normalise for functionality and set factory gate ED requirements that are independent of the ultimate application	Y	Sometimes	a, b, c
Installed (assembled) at the user's site	Affects ability to set ED factory gate requirements and may require ED installation level requirements. May also affect heterogeneity and hence ability to normalise for functionality and set requirements on products independent of application.	Y	Sometimes	a, b, c
May have different performance levels dependent on the operating conditions at the user's site	Site (application) dependency complicates ability to set factory gate ED requirements	Y	Y	a, b, c
Has functional parameters that are inherently difficult to measure	Reduces the certainty in the performance assessment	tbd	Sometimes	a, b, c
Performance is strongly dependent on the duty cycle	Ability to rank ED performance is sensitive to the reliability (stability) of the duty cycle assumption	tbd	Often	b, c
Duty cycle is strongly dependent on the application	Reduces ability to set specific ED factory-gate requirements. Would favour setting application dependent (installer level) requirements	tbd	Often	b, c

tbd = to be determined

From Table 1 it may be seen that whilst DSDs are complex, MTs are probably even more so.

The other rationale for using a points-based approach would be when there is a need to provide an overall assessment of a product's ecodesign performance that balances the impact of optimising design options across different, and non-readily comparable, environmental impact parameters. In this latter case there is an unambiguous need to apply a common values framework (which a points system would represent), whenever trade-offs might be required between design options that could reduce one environmental impact while increasing another. An example could be a reduction of in-use energy consumption achieved by a design solution that increases noise emissions. Note that an alternative approach could be to set minimum or maximum permitted values for one impact parameter (e.g. maximum permitted noise levels) and then optimise for the other impact parameter. A points approach could still set limit values, but would allow the designer to optimise across both parameters and hence, in principle, would broaden the permitted solution sets that satisfy the combined requirements. Note: this rationale is not necessarily an issue exclusively pertaining to complex products. It should also be noted that the stakeholders consulted expressed doubt about the validity and feasibility of cross-impact parameter comparison approaches.

4.2 Cardinal and ordinal impact parameters

An ordinal parameter is one wherein the rank order is known but not the relative magnitude. A cardinal parameter is one where the magnitude is known in addition. As such, a standard energy efficiency metric is a cardinal parameter, whereas an ordinal parameter would be one where a ranking is known (1^{st}, 2^{nd}, 3^{rd} etc. but not the magnitude). A nominal parameter is one that can be defined by name but cannot be ordered in a ranking, nor ascribed a magnitude. The relevance of these notions to ecodesign assessment is that some impact parameters (such as an Energy Efficiency Index, EEI) have a clear magnitude, others can be ranked in order but have uncertain magnitudes, and still others can only be named but not ranked in a preferred order. In theory, a points system could be used to take all these parameters into account within a common framework, even if they all apply to the same environmental impact. For example, the efficiency of a power supply may be assessed in a cardinal manner, the presence of different levels of controllability in an ordinal manner and whether, or not, a product has the capability to make use of free cooling is nominal and binary. In principle, points could be awarded to each of these elements, based on an assessment panel's notion of their likely importance to an overall energy performance score.

In going through this process it is first imperative to determine whether a product feature is cardinal, ordinal or nominal with respect to the impact parameter being considered. Note, some features may be deemed to be ordinal or nominal, solely due to a lack of sufficient data to enable them to be assessed in a cardinal (or ordinal) manner. Thus, the status of a product feature with regard to an impact parameter may be information-dependent, and subject to change in the future.

4.3 Modularity in product design

If a product is modular (i.e. comprised of modules) and if each module serves a function that can be clearly related to an environmental impact parameter, then it may be possible to assess the contribution each module makes to the function and equally its ecodesign impact. Points could then potentially be awarded on a module-by-module basis and aggregated upwards to attain an overall score; however, this could be greatly complicated in cases where the modules affect the

performance (and hence assessment) of other modules, and in cases where there are trade-offs in functionality from one function to another (for modules having more than one function).

4.4 Modularity in points system design

A priori, a points system can be designed in such a manner that a first version aims to address a sub-set of impact parameters for which sufficient information is known to allow such an assessment. However, if the points system itself is designed to have a modular structure, then it will be possible for additional impact parameters to be included into future assessments (by the addition of a new assessment module) at a time when enough information is available to do so. It is therefore proposed that any generic points-system methodology is structured to allow such modules to be added in accordance with needs, to ensure that the methodology is pertinent and dynamic.

4.5 Treatment of limit values

A priori, a points system could be designed to permit the inclusion of limit values for specific parameters, or not. It may also be designed to ascribe an overall limit value (minimum number of total points) and/or to have a classification system wherein the product is classified depending upon its overall points score. Lastly, classification associated with points can also be permitted for any specific environmental impact parameter (e.g. an energy label could be classified from A to G depending on the points for energy performance attained by a product). Thus, in principle a points system could be classified to produce not only an overall ecodesign impact classification, but also one or more impact parameter-specific classifications. To the extent possible, the general points-system methodology described in this report will permit any of the above approaches (including having no limit values at all) and thus allow flexibility in this respect.

4.6 Considering how certainty affects the manner in which a single environmental impact performance metric should be assessed

In principle, any ecodesign methodology that aims to set specific ecodesign requirements should permit a rigorous cardinal performance metric to be derived and used whenever this is viable. In practice, sometimes this is not the case, such that it may be that none or only part of a product's performance can be determined in this way and the remaining parts can only be considered via ordinal or nominal assessment parameters. Furthermore, there are always differing degrees of certainty about the assessment of performance metrics in general. When there is a mixture of cardinal, ordinal and nominal data, or alternatively when there is a set of modules whose individual performance can be assessed cardinally but whose collective performance cannot (because of uncertainty about the contribution each makes to the overall impact parameter budget and/or because of uncertainty about how they interact with each other) it may be appropriate to apply a points-based approach. The points-based approach should, to the extent that it is knowable, apply points which are weighted to be proportional to the impact that each ecodesign characteristic is expected to make to the overall environmental impact parameter. In practice the certainty about the impact will be highest for product features that can be assessed in a cardinal manner, lowest for those which are nominal, and intermediate for those which are ordinal. The weighting ascribed to the impact parameters could, and arguably should, be weighted to give higher importance to the more certain impact parameters.

Note, this certainty may also take into account the extent to which it is possible (or practical) to verify the impact parameter's sub-elements. Thus aspects which are

very hard to verify through market surveillance could be given less weight than those which are readily verifiable. The option of using Notified Bodies to assess compliance with generic design processes could also be considered here[2].

4.7 Factors that affect weighting within a complex impact parameter e.g. uncertain energy budgets and weighting of an energy performance index

For most energy-using products energy consumption in-use is the dominant environmental impact within a broader (EcoReport tool v 3.06) LCA. The energy in use is affected by:

- The energy use of each component which in turn is affected by the efficiency of each component (service delivered per unit energy consumed) and the usage (duty) profile of each component. The duty profile is affected not only by the underlying service need, but also by the capacity to control the component to minimise the extent it draws energy when not required to provide a service.
- The interactions between the components; this affects how they perform collectively as a product system.
- The scope of the product system boundary considered. For example, data storage devices draw energy to process data but also require energy to be used to keep them cool – the product energy consumption and efficiency (and hence Ecodesign optimisation) is sensitive to the scope of the product system boundary considered.
- User behaviour, which in turn may be influenced by the provision of information and guidance.

Whatever methodological system that is considered (whether for application in a conventional Ecodesign regulatory approach or for a points-system approach) has to aim to correctly characterise and treat these aspects to the extent it is possible and viable to do so. This means that the impact of each element on the overall energy budget and energy performance has to be assessed and weighted proportionally to its expected impact.

4.8 Compatibility with the MEErP process

Any proposed points-system methodology needs to be compatible with the MEErP process used to support implementation of Ecodesign Directive 2009/125/EC.

[2] Under Article 8.2 addressing conformity assessment in the Ecodesign Directive, the economic operator must choose between:

- Annex IV: internal design control; or
- Annex V: management system.

In addition, Art 8.2 states: "Where duly justified and proportionate to the risk", the conformity assessment procedure specified within an Ecodesign Implementing Measure (e.g., a Regulation) may be stipulated by choosing one of the modules specified in Decision No. 768/2008/EC. Some of these modules involve extensive actual product testing by the market surveillance authorities, and some encompass only a verification of the management system in place (i.e., a testing of the IT-based or paper-based management system, as opposed to taking product examples off the assembly line, and testing them in an external test laboratory).

4.9 Fit with regard to the way of setting Ecodesign requirements

Any proposed points-system methodology needs to be appropriate with and fit with the way of setting Ecodesign requirements specified within the provisions of the Ecodesign Directive 2009/125/EC. In particular this needs to address: the regulatory process followed (see section 6 for more details), the nature of implementing measures considered (generic or specific or both), designating the actors responsible (considered in section 5).

4.10 Extent to which the stated parameters are measurable via standards

Ideally, the parameters to be assessed using a points-based approach will be measurable via standards. In some cases there may be no existing standards but the development of such standards should be readily imaginable in the future. In principle, it is important that any proposed methodology does not rely on assessments that can only be done via subjective, poorly definable processes that are unlikely to be repeatable (i.e. consistent each time they are conducted) or reproducible (i.e. consistent from one assessor to another). The existence or potential for measurement and/or assessment standards will therefore need to be fully considered.

4.11 "Products-within-products" issues

Any points system method proposed needs to be appropriate with regard to how the stated parameters incorporate requirements that build upon existing Ecodesign requirements specified at the modular and component level (e.g. for motors and fans). Note that this products-within-products issue is not a unique concern for a points-system methodology.

4.12 Specific versus generic ecodesign requirements

Ecodesign requirements can be set to be specific (i.e. to set minimum performance limit values on certain impact parameters), to be generic (i.e. to prescribe a process that needs to be followed in the design or placing on the market of a product) or informational (i.e. specify information that needs to be made available prior to and after placing the product on the market).

Specific requirements are likely to have the most certain impact and hence are the most powerful regulatory tool; however, because they remove products with certain features from the market they also require the greatest certainty of net benefit prior to their introduction. In some cases there may be a high uncertainty regarding the point of least life cycle cost, or the circumstances in which a given limit value provides net benefits (depending on specific functionality and usage requirements). A points approach allows a more nuanced treatment where softer limit values could be set than the least life cycle cost average while other features or generic processes could be given value and encouraged. In theory, a parallel compliance pathway requirement could be specified wherein a product either has to meet minimum specific values regardless of where it is used, or has to demonstrably follow a design optimisation process (awarded points for the rigour of approach used and where a minimum points score is specified) tailored to the client needs (in terms of functionality and usage) but respecting broader Ecodesign principles such as energy performance levels that produce the least life cycle cost for the end-user. The first (and traditional) compliance pathway specifies performance limits which are verifiable at the factory gate but places obligations on the product system specifier and installer too; whereas the second compliance pathway imposes no limits on the product as it leaves the factory gate (except potentially informational requirements) but imposes constraints on the product

system specification and installation phase. Note these product specification requirements could also occur in a factory for packaged products that are custom-made.

It is envisaged that a points-system methodology needs to be sufficiently flexible to address both of these cases and also hybrids combining elements of both.

4.13 Fairness and proportionality

Any points-system method proposed will need to be consistent with an approach that does not penalise SME's and that results in equal and proportional treatment of market actors.

5. Methodological framework for an Ecodesign points-system

This section applies the principles discussed in the section 4 within a methodological framework for the consideration and establishment of an Ecodesign points-system that could be applied to complex products. The first four assessment steps gather and organise data elements needed for the determination of whether a points-system approach is justified and feasible in principle. Step 5 assesses this, enabling the determination of appropriateness and feasibility to be determined. Steps 6 to 9 are conducted if a points-system approach is deemed appropriate, and as such has to be derived. Step 10 considers additional actions that would be needed to support the regulatory process.

The structure of the step-by-step methodology set out in this section is consciously designed to address the following requirements (i.e., the needs and constraints):

- To evaluate environmental impact parameters in isolation and not to combine them within an overall points scheme
- To ensure that the impact of design options are awarded points in proportion to their effect on the impact parameter in question
- To be as comprehensive and inclusive as possible, thereby allowing the option to extend the scheme's structure to include: the environmental impacts deemed appropriate, the product scope that is deemed most appropriate, and the intervention phases deemed appropriate
- To work at whatever application grouping levels are deemed to be appropriate
- To address product modularity
- To fit within the MEErP methodology
- To work with the Ecodesign and energy labelling regulatory process
- To respect the needs of conformity assessment
- To enable complexity to be addressed.

Step 1 Assessment of key lifecycle stages

This step entails assessing the various product lifecycle stages from a cradle–to-grave perspective to determine which of them are pertinent to be considered for potential Ecodesign measures. Basically, the MEErP Tasks 1 to 5 are conducted, utilising the MEErP methodology as it is presently formulated. Then, the findings from MEErP Task 5 are taken, i.e., dealing with the environmental impacts and associated LCA work (see Figure 1). At this point, one must screen the impact

assessment parameters and product lifecycle stages for pertinence in the setting of prospective Ecodesign measures. As such, it is exactly the same process as would be undertaken for any product being assessed through the Ecodesign regulatory process. The findings of this assessment are noted and are then used to inform the boundaries of applicability of any prospective points-system approach.

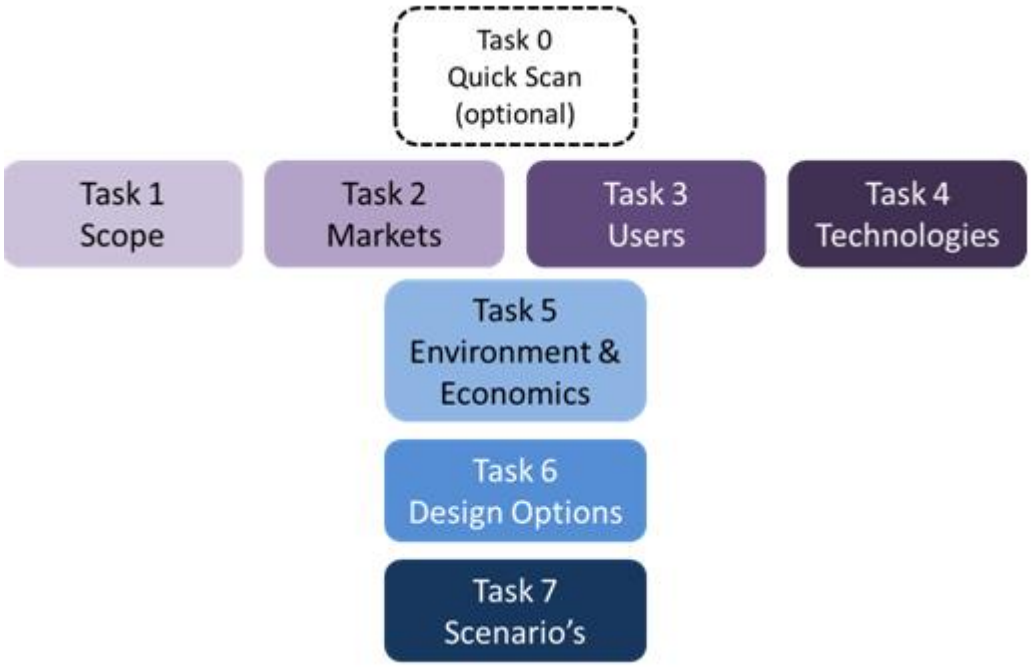

Figure 1: *The MEErP Tasks*

The above results indicate the potential scope of a prospective points system, where ideally the points system would be designed to be comprehensive enough to apply to the most pertinent lifecycle stages for which Ecodesign improvements could be practically encouraged.

Step 2 Assessment of product scope boundaries and associated impacts at the wider (extended product or product-system) level

Conduct the following assessments:

a) Does the product have impacts only at the simple product level?
b) Does the product have impacts at an extended product level?
c) Does the product design have impacts at the wider product system level?

Noting the answers to the above questions indicates the potential scope of a prospective points system. The more negative answers that result means that the more likely it is that one is dealing with a complex product. As such, it may be that a "points system" approach could be applicable, and useful. Ideally, the points system would be designed to be comprehensive enough to apply to the largest product scope boundary for which Ecodesign improvements could be practically encouraged.

Step 3 Selection of environmental impact criteria

The treatment of environmental impact criteria discussed in this section takes as input the information derived from the MEErP. The MEErP was intentionally designed to evaluate the environmental impact of energy-related products and hence gives its principal focus to energy performance assessment and thus it is possible that in the future there may be a need to expand its capacity to be able to better take account of other environmental impacts such as material efficiency; however, the methodology set out in this report makes use of the MEErP as it currently is.

Treatment of environmental impact criteria

Independent treatment of impact criteria

As indicated in sections 3 and 4, stakeholders advised that any prospective environmental impact criteria should be considered separately within a points-system scheme and not combined within a common structure because of the contentiousness of trying to compare, or weigh, the relative importance of one type of environmental impact criterion against another. It is therefore proposed in this methodology that each impact criterion will be considered in isolation and if a points approach is to be used it would be established for each impact criterion independently of the others.

Number of impact criteria to be treated

While the case studies considered in this Task 4 report only consider one or two impact criteria the methodology set out here could in principle be used for as many impact criteria as are considered appropriate. Thus, if experience with using the methodology develops then potentially more than two impact criteria could be considered in future applications of this methodology.

Stakeholders advised that, for pragmatic reasons, only one or a maximum of two impact criteria should be considered for the application of points systems. This guidance was aimed at the current project and was intended to avoid the project, or subsequent applications of the work it produces, attempting to be too ambitious while the notion of using a points-system is relatively embryonic; in other words, it should first be developed and tested. In future, greater sophistication in dealing with numerous evaluation and/ or impact criteria could subsequently be added on, to build on the initial "proof of concept".

Selection of environmental impact criteria

The choice of the criterion, or the criteria, could be proposed by the consultants during the preparatory study process once the work of the MEErP Task 5 ("Environment & Economics") has been completed. It would be informed by the evidence from the EcoReport tool assessment on the criteria with the greatest environmental impact and highest improvement potential. The recommendation could be discussed at the subsequent stakeholder meeting prior to a decision being made by the Commission. In most cases the energy performance of the product during the use phase is likely to be the most important criterion. Material efficiency performance is another environmental impact criterion mentioned by several stakeholders.

Process to be followed following selection of environmental impact criteria

Once each environmental impact criterion has been selected Steps 4 to 9 below are followed independently for each of the impact criteria in turn.

Step 4 Determination of the phases at which product design may influence lifecycle impacts

This step entails assessing the various product lifecycle phases from the perspective of when there may be an opportunity to consider setting requirements that would influence the ecodesign performance of the product. The table below illustrates an example of this process. In this example, generic Ecodesign implementing measures could be conceivable for 6 of the product phases and specific implementing measures for 3.

Table 2: Example of the consideration of the phases at which product design may influence lifecycle impacts.

Lifecycle phase	Potential Ecodesign measure	
	Generic	Specific
Initial factory design phase	Y	N
Detailed factory design phase	Y	Y
Specification phase	Y	Y
Installation phase	Y	Y
Use phase	Y	N
End of life phase	Y	N

This assessment of phases which are potentially suitable for Ecodesign implementing measures helps to determine the boundary of applicability of a prospective points system.

ACTION

Take note of the findings, which indicate the potential generic and/ or specific scope of a prospective points system, where ideally the points system would be designed to be comprehensive enough to apply to all the product lifecycle phases for which Ecodesign improvements could be practically encouraged.

Step 5 Assessment of whether a points system approach is potentially merited or not

Answer the following question for ***each*** of the cases a) to c) ("Yes/No"). Is there a degree of doubt about the practicality and quality of the ecodesign performance assessment of the product because:

a) there are a mix of quantifiable (cardinal) and more qualitative product ecodesign features, yet it is appropriate to also ascribe some value to the qualitative features because these are expected to bring environmental benefits?
b) although the presence of specific ecodesign features is known to bring environmental benefits, the relative importance of the benefit to a given environmental impact parameter is difficult to determine in a reliable manner, at the level at which the scope of a prospective regulation would be expected to apply?

c) it is too complex to apply a rigorous performance assessment method in practice, but a points-based approach (which awards points depending on the ecodesign features used) could provide an acceptable compromise that allows requirements to be set that encourage progress in a positive direction without being overly constraining?

If the answer to any of these questions is "Yes", then a points-system approach may be appropriate, otherwise it is unlikely to be.

Step 6 Assessment of the implications of product modularity

If a product is modular (i.e. comprised of modules) and if each module serves a function that can be clearly related (i.e. mapped) to an environmental impact parameter then it may be possible to assess the contribution each module makes to the function and equally its environmental impact.

If this is the case then in principle points could be awarded on a module by module basis and aggregated upwards to attain an overall score.

Equally though it may be possible to simply apportion impacts to each module without requiring the application of points e.g. if module 1 is responsible for 30% of a given impact and module 2 is responsible for the remaining 70% then it could be possible to derive a conventional impact performance factor index (such as an EEI) by proportionately weighting the contribution from each module to the whole. Thus a points approach would not be needed.

Does each module fulfil a specific and unique function?

i) If Yes, then their performance impacts (such as an EEI) can be treated and assessed independently of each other. Move to Step 7.

ii) If No, and more than one module serves the same function then:

a) is it possible to quantify the proportion of the function provided by each module under a set of representative usage cases?

If Yes, then it should be possible to treat the modules as an extended product and to use a duty profile approach to proportionately weight the impact each module makes on a given performance and impact factor in order to develop a functional impact rating. Move to Step 7.

b) is it possible to partially quantify the proportion of the function provided by each module under a set of representative usage cases? (i.e. might a mix of cardinal and ordinal impact information be available?)

If Yes, then it should be possible to treat the modules as an extended product and to use an estimated impact budget approach to proportionately weight the impact each module makes on a given performance and impact factor in order to develop a functional impact rating. Move to Step 7.

c) is it impossible to quantify (even partially) the proportion of the function provided by each module under a set of representative usage cases?

If Yes, then is likely to impractical to try and apply a points-system approach to the product. Stop the process.

iii) If No, because the same module may perform more than one function then:

a) are the performance impacts for each function (such as an EEI) independent of each other?

If Yes, then consider whether either steps i) or ii) above may apply

If No then it may not be possible to derive a meaningful performance impact assessment for that specific function (even using a points-system approach). Stop the process.

Note: if a product is packaged and not modular then the above assessment can be omitted.

The findings of this assessment determine whether a points-system approach is likely to be viable for a modular product and also help inform the design of the points system if the answer is positive.

Step 7 Assessment of the implications of product performance sensitivity to the final application

The principal purpose of this step is to aim to identify the level(s) of stability at which a representative duty profile can be defined for the product in question.

Considering why the product performance may vary as a function of the application

The use made of a product is often different depending on the application it is being used for. This may systematically affect the typical duty profile that the product is operated under and/or may systematically affect the functional activity the product is being used for. For example, fluorescent lamps essentially always serve the same function (to provide illumination) but the characteristic duty profile that they are operated under varies systematically depending on the type of building they are installed in (e.g. residential usage profiles are quite different to those found in offices). Some products, such as some categories of machine tool, are capable of providing more than one function (e.g. cutting and forming), and the characteristic duty profile may also vary depending on the nature of the application (e.g. the nature of the business in the case of machine tools) the product is being used for. The normal analyses within a preparatory study will determine the extent to which a product's environmental impact performance is sensitive to the application it is being used for and this information would need to be fed into the following analytical step.

Analytical step

Answer the following question for the environmental impact criterion being considered.

Is the product's environmental performance sensitive to the final usage application?

a) If the answer to this question is No then move on to Step 8.

b) If the answer to this question is Yes, then consider whether these applications can be grouped into types with relatively consistent characteristics i.e. is the

variation in performance within an application group[3] sufficiently limited[4] (e.g. the behaviour within the application group is relatively homogeneous) to enable a meaningful performance metric to be defined for each application group?

b1) If the answer to b) is Yes, then it is appropriate to identify each relevant application group for which this is true and to follow Steps 8 and 9 for each of these in turn.

b2) if the answer to b) is No then it implies it is inappropriate to set specific Ecodesign requirements for the performance of this product with respect to the environmental impact parameter in question and therefore only generic Ecodesign requirements should be considered for the performance of the product with respect to the environmental impact parameter in question. At this stage in the evaluation a decision would need to be taken as to whether:

a) only a points system based on an assessment of generic Ecodesign requirements[5] is appropriate, or

b) one that might also include specific requirements to be imposed on the product specifier or installer may also be appropriate (see the following discussion).

Note that the need to make this assessment is not unique to products where a points system is being considered, and is true of all products considered for Ecodesign requirements. Nonetheless in both cases it is important to determine whether it is feasible and appropriate to consider imposing Ecodesign requirements:

a) at the point at which a product is first placed on the market, or
b) on the designer/specifier for products which are assembled on the site of usage, or
c) on the installer, or
d) not at all.

In practical terms, if specific Ecodesign requirements are to be applied from the point at which a product is first placed on a market then they should be appropriate for all the applications for which the product is likely to be subsequently used. If the requirements need to be different depending on the application then it should be practicable to either clearly define the application for which the product is intended and/or for the product to have different supply channels depending on the intended application (an example of this is the distinction between domestic and other types of lighting products, which enables specific Ecodesign requirements[6] to be set for lighting products likely to be used in domestic applications, but which could conceivably also be used in non-domestic applications).

[3] An application group is a sub-set of all the applications for which the product is likely to be used and is commonly defined by the type of user concerned (e.g. domestic, commercial or industrial), or the type of process the product is being used for (e.g. drilling or cutting), or the nature of duty profile required by the application (e.g. constant demand or variable demand).

[4] In other words, when the usage of the product within the application group is sufficiently homogeneous that its environmental impact performance can be adequately represented by a single representative duty profile.

[5] See Annex I of Ecodesign Directive 2009/125/EC (European Commission 2009)

[6] See Annex II of the Ecodesign Directive (European Commission 2009)

In principle, application-specific Ecodesign requirements could be imposed on products that are specified by a product system designer and/or installer because it can also be said this is when the product is placed on the market. This would allow greater differentiation in Ecodesign requirements to be specified depending on the nature of the final application for the product. In addition, product specifiers and installers could be required to follow generic Ecodesign requirements that would govern the process they are required to follow in specifying and installing products for any given application.

Naturally, while this determination is not unique to products for which a points-system approach is being considered it is informative to help decide what aspects of the product design and installation process might be suitable for the use of a points system. The potential outcomes of the assessment and relation to the type of Ecodesign requirements that could be considered are shown in the matrix below.

Table 3: Matrix illustrating the potential applicability of Ecodesign measures as a function of the sensitivity of the product's Ecodesign performance to the product application.

	Specific Ecodesign Requirements when first placed on market	Specific Ecodesign Requirements for product specifer/ designer	Specific Ecodesign Requirements for product installer	Generic Ecodesign Requirements for product specifer/ designer	Generic Ecodesign Requirements for product installer
Performance assessment is insensitive to the product application	Yes	Not needed	Not needed	Potentially	Potentially
Performance assessment is sensitive to the product application and the intended application can be specified at the time of first placing on the market	Yes	Not needed	Not needed	Potentially	Potentially
Performance assessment is sensitive to the product application and the intended application cannot be indicated at the time of first placing on the market but can be by a site-specific product designer or specifier	No	Potentially	Potentially	Potentially	Potentially

Step 8 Determination of environmental impact budgets

Note that if the answer to 7b is Yes then the process described in this step needs to be conducted for each application group in turn.

The determination of the environmental performance impact budget requires the derivation of a representative product duty profile. This profile needs to assess the product duty profiles while respecting the product boundary scope determined in Step 2. It also needs to be differentiated for each pertinent application group as determined in Step 7. Once the duty profile is known then the environmental impact performance can be assessed for each aspect of the duty profile. This can be done for the reference case product and successively for product designs employing design options that reduce the environmental impact at one or more of the phases of the duty profile. Assessment of each one of these product cases will entail the derivation of an environmental impact budget broken down by duty profile phase. E.g. consider energy consumption in use for a product with 4 duty profile phases (off, standby, part-load, and full capacity). Table 4 below indicates how the energy budget might be broken down by each of these use phases for a

reference case product and a succession of products where Ecodesign measures are employed progressively. In this example the table applies to a simple product.

Table 4: Example of an energy budget by design option for a simple product.

	Off	Standby	Part-load	Full-Load	Total
Fraction of time	24%	42%	26%	8%	
Energy consumption for duty profile phase (kWh/year):					
Reference case	0.0	14.7	189.0	58.2	261.9
Design option 1	0.0	14.7	113.4	58.2	186.3
Design option 2	0.0	14.7	102.1	52.3	169.1
Design option 3	0.0	14.7	91.9	49.7	156.3
Design option 4	0.0	14.7	82.7	47.2	144.6
Design option 5	0.0	14.7	74.4	44.9	134.0
Design option 6	0.0	10.3	72.2	43.5	126.0
BAT	0.0	7.2	70.7	42.7	120.6

If an extended product with two modules is considered then Table 5 illustrates an example of an energy budget broken down by duty profile for the reference case and successive Ecodesign cases. The same principle could be applied to derive an environmental impact budget for a product comprised of any number of modules.

Table 5. Example on a modular or extended product energy budget by design option (for a product with 2 modules)

	Module A					**Module B**					**Combined**
	Off	Standby	Part-load	Full-Load	Total	Off	Standby	Part-load	Full-Load	Total	Total
Fraction of time	24%	42%	26%	8%		10%	27%	48%	15%		
Energy consumption for duty profile phase (kWh/year):											
Reference case	0.0	14.7	189.0	58.2	261.9	0.0	16.6	567.6	203.7	787.9	1049.8
Design option 1	0.0	14.7	113.4	58.2	186.3	0.0	16.6	454.1	203.7	674.3	860.7
Design option 2	0.0	14.7	102.1	52.3	169.1	0.0	16.6	372.4	203.7	592.6	761.8
Design option 3	0.0	14.7	91.9	49.7	156.3	0.0	16.6	327.7	179.2	523.5	679.8
Design option 4	0.0	14.7	82.7	47.2	144.6	0.0	16.6	294.9	170.3	481.7	626.4
Design option 5	0.0	14.7	74.4	44.9	134.0	0.0	16.6	265.4	161.8	443.7	577.8
Design option 6	0.0	10.3	72.2	43.5	126.0	0.0	11.6	257.5	156.9	426.0	552.0
BAT	0.0	7.2	70.7	42.7	120.6	0.0	8.1	252.3	153.8	414.2	534.8

Similarly, the energy budget can be extended to encompass the broader system and hence not just the energy used directly by the product itself but to include the impact it has on the broader system's energy use. Note in the example shown in Table 6 below Module A's performance is the same as the product above but in an extended product it is possible that its energy consumption will be affected by the interaction with the other elements of the extended product (Module B in this example).

Table 6. Example of an energy budget by design option for a product system

	Module A					**Module B**					**Impact on other system energy consumption**	**Combined**
	Off	Standby	Part-load	Full-load	Total	Off	Standby	Part-load	Full-Load	Total		Total
Fraction of time	24%	42%	26%	8%		10%	27%	48%	15%			
Energy consumption for duty profile phase (kWh/year):												
Reference case	0.0	14.7	189.0	58.2	261.9	0.0	16.6	567.6	203.7	787.9	393.9	1443.7
Design option 1	0.0	14.7	113.4	58.2	186.3	0.0	16.6	454.1	203.7	674.3	337.2	1197.8
Design option 2	0.0	14.7	102.1	52.3	169.1	0.0	16.6	372.4	203.7	592.6	296.3	1058.1
Design option 3	0.0	14.7	91.9	49.7	156.3	0.0	16.6	327.7	179.2	523.5	261.7	941.5
Design option 4	0.0	14.7	82.7	47.2	144.6	0.0	16.6	294.9	170.3	481.7	240.9	867.3
Design option 5	0.0	14.7	74.4	44.9	134.0	0.0	16.6	265.4	161.8	443.7	221.9	799.6
Design option 6	0.0	10.3	72.2	43.5	126.0	0.0	11.6	257.5	156.9	426.0	213.0	765.0
BAT product only	0.0	7.2	70.7	42.7	120.6	0.0	8.1	252.3	153.8	414.2	207.1	741.9
System DO1	0.0	15.1	74.3	46.8	136.3	0.0	17.0	254.3	157.7	429.0	145.0	710.2
BAT system	0.0	15.1	72.8	45.9	133.9	0.0	11.9	249.2	154.5	415.6	116.0	665.5

Lastly, in principle the environmental impact parameter budget can also be extended to cover different potential intervention phases if these are deemed to be important to encourage good ecodesign practices for the product (see discussion in Step 4). For example, if it is thought likely that the provision of user advice and/or in use feedback will bring about ecodesign benefits during the product use phase then the advice/feedback "design options" can be added to the environmental impact parameter table and ascribed expected benefits (i.e. in the case illustrated above ascribed reduced in-use energy consumption values compared with the reference case). This type of benefit estimation is generally uncertain (sometimes highly so) and hence needs to be managed accordingly. The text in the following sub-section explains how this can be done.

Managing uncertainty

The case above addresses cardinal data where the impact of the design option on the impact criterion is quantifiable and measurable; however, as previously discussed in Step 5 cardinal data is not always available, and this is especially the case when a points-system approach is being considered. Often the data will be a blend of cardinal and ordinal information, where for the ordinal data the rank order of the design option impact on the environmental criterion is known but not the precise magnitude. For these cases it is proposed that the consultants leading the preparatory study should derive estimates of the magnitude of the impact expected from the design option with the ordinal data and apply this in the parameter budget derivation process. To do this the consultants would need to assemble all the available information that might permit estimates to be derived, so that the estimation process is as fully informed as possible for each of the duty profile cases considered above.

When a blend of cardinal and ordinal data is used it will be important to keep track of which of the budget values are cardinal and which ordinal (and hence are estimates) as this may influence the weighting eventually given via the points-system (noting that there is a rationale behind giving greater weighting to cardinal data than ordinal).

In the event that the table includes ordinal data or a blend of cardinal and ordinal data then the normalisation process could:

a) either proceed exactly as set out above i.e. where no distinction is made between the quality of the cardinal and ordinal data, or
b) be done in such a way that the cardinal data is given a higher weighting than the ordinal data.

If only ordinal data is available then case a) above would apply. If a blend of cardinal and ordinal data is present and it is felt appropriate to give less weight to the ordinal data than the cardinal then the approach to be taken would be to discount (i.e. reduce) the estimated benefit expected from the design options using ordinal data in Step 8. For example, if the best estimate of the benefit from an ordinal design option is a 20% energy saving, but there is a significant uncertainty over this value, then it could be deemed to be appropriate to only ascribe 60% of this benefit in the energy budget evaluation i.e. a 12% energy saving. As there are many possible causes of uncertainty and the level of uncertainty is usually unknown too it is not really appropriate to prescribe a single method for treating this within an Ecodesign accounting framework; however, a simple approach might be as follows:

- Assess the uncertainty in the magnitude to be ascribed to the ordinal design option parameters (e.g. +/- 50%)

- Assess the uncertainty expected in the cardinal design option parameters (this could be the accepted measurement tolerance e.g. +/- 15%)

- Determine the net difference in uncertainty between the ordinal and cardinal values (e.g. 50%-15% = 35% in the example above)

- Then discount the magnitude of benefit allocated to the ordinal design option in the impact parameter budget tables by half this net difference (e.g. reduce the benefit ascribed by 17.5% in the above example).

Exactly the same process can be followed when dealing with environmental impact budget data that is associated with different potential intervention phases. For example, for the case of the provision of user advice and/or in use feedback the values ascribed in the table would be noted as being estimates and, if deemed appropriate, the expected benefits ascribed to these measures could be discounted to take account of the level of uncertainty in the manner just set out.

Step 9 Normalisation and awarding of points

Once the environmental impact assessment budgets have been established in Step 8 as a function of the design options, then the next step is to normalise the values as a precursor to assigning a points scale.

If we consider the extended product case operating in a wider system as shown in Table 6 above the normalised consumption becomes as shown in Table 7 below when it is normalised against the energy consumption of the reference case product.

Table 7: Example of a normalised energy budget and points allocation for the extended product system example considered in Table 6

	Module A	Module B	Other system Energy use	Total Energy	Points Awarded
Reference case	100%	100%	100%	100%	0
Design option 1	71%	86%	86%	83%	17
Design option 2	65%	75%	75%	73%	27
Design option 3	60%	66%	66%	65%	35
Design option 4	55%	61%	61%	60%	40
Design option 5	51%	56%	56%	55%	45
Design option 6	48%	54%	54%	53%	47
BAT product only	46%	53%	53%	51%	49
System DO1	52%	54%	37%	49%	51
BAT system	51%	53%	29%	46%	54

Note, that this process is essentially the same as that which is followed to determine an energy efficiency index (EEI), as it involves normalising the product performance to a reference case. In principle, the same process can be followed for any quantifiable environmental impact parameter.

In the above example the points are awarded for energy performance on a scale of 0 to 100 and are allocated in proportion to how much less the product in question

uses compared to the base case. Thus, a product which uses no energy as an extended product nor does it require system level energy use would have a score of 100. The maximum number of points that can be awarded is not important; however, it is important that the point allocation is proportional to the environmental benefit delivered to the extent by which this can be assessed.

Managing uncertainty
In the event that the table includes ordinal data or a blend of cardinal and ordinal data then the normalisation process could:

a) either proceed exactly as set out above i.e. where no distinction is made between the quality of the cardinal and ordinal data, or
b) be done in such a way that the cardinal data is given a higher weighting than the ordinal data.

However, this issue is addressed in Step 8 and the normalisation process would simply use the final impact parameter budget data that comes out of that stage.

Step 10 Support to regulatory decision-making

Once a points-structure has been allocated for each of the (up to two) environmental impact criteria being considered then this information can be used to assess the distribution of products available on the market (and potentially available) against the points allocation for each impact parameter in turn. Combined with an economic analysis from the MEErP Task 5 and design option analysis from MEErP Task 6 it would be possible to construct policy impact scenarios associated with the market for new products progressing towards certain points score distributions in response to Ecodesign implementing measures and energy labelling (noting that the points scores will correlate with the environmental and economic impacts). The generic points methodology outlined above maps as neatly as is possible to a conventional MEErP approach using impact performance indicators such as EEIs; however, it enables less perfectly quantifiable data (associated with design options that have more uncertain impacts) to be treated within this framework. It also potentially allows for the uncertainty in the data to be reflected via a discounted impact assessment methodology. Thus it remains possible to use the same regulatory approach to set limit values as is already used in Ecodesign and labelling regulations, although in this case they would be for minimum permitted points-scores.

In the example of the points allocation shown in Table 7 the reference case product scores 0; however, it would be straightforward to adapt the scale so that 0 points is associated with say the worst product on the market or some other start point, if that were deemed to be an appropriate end-point. The decision regarding the lower end point is a regulatory one rather than a methodological one. Equally the decision regarding any proposed limit value is also a regulatory issue. In principle life cycle cost analysis could be utilised to determine the EEI and corresponding points score, just as is currently done to inform energy performance limit values.

Essentially the same approach could be used to establish a labelling classification based on the points-classification, exactly as would be done using a conventional EEI indicator. Lastly, the points approach set out above has the flexibility to recognise and award points for generic (i.e. process orientated) Ecodesign measures, such as for the quality of guidance and information provided. Thus in cases where there is a desire to blend points allocations for specific and generic

design measures within one framework it is possible to do so; however, it imposes the analytical discipline of trying to estimate the expected benefits of the generic measures (even if these are very difficult to know and highly uncertain). Such an action would constitute a new analytical stage which is not currently expressed within the MEErP.

6. Linkage of the generic methodology to the MEErP and Ecodesign process

The 10 methodological steps outlined above are designed to work and complement the existing MEErP methodology and the overall Ecodesign regulatory process. Once a preparatory study is launched it would assess the scope (Task 0/1), the markets (Task 2), users (Task 3), and technologies (Task 4). LCA impacts are determined in Task 5 and ecodesign design options are assessed in Task 6, as shown in Figure 1.

Through this process clarity is gained regarding the following:

- The importance of the various environmental impact parameters via the EcoReport tool and LCA of Task 5
- The representative duty profiles (via Task 4)
- The representative reference case products and application groups (via Task 4)
- The ecodesign options and whether or not these entail a mix of cardinal, ordinal and qualitative data (via Task 6)

After the assessment of the design options in Task 6 it will be clear whether the design option impacts can be assessed with purely cardinal data, in which case a traditional Ecodesign approach will be valid, or whether it is necessary to include ordinal and/or qualitative data, in which case a points-system approach could be merited. Thus, the moment following on from the assessment of Task 6 would be the logical moment to conduct Steps 1 – 5 of this suggested analytical framework, to decide whether a points system approach is merited or not. If the conclusion is that it is, then the remaining Steps 6 to 10 of this framework should be conducted.

At this stage some iteration would be required compared with the standard MEErP process. While Steps 1-5 are relatively straightforward to conduct the subsequent Steps 6 to 10 are more involved and may require adjustment of the Preparatory Study's schedule and resources. These are:

- Step 6 Assessment of the implications of product modularity
- Step 7 Assessment of the implications of product performance sensitivity to the final application
- Step 8 Determination of environmental impact budgets
- Step 9 Normalisation and awarding of points

- Step 10 Support to regulatory decision-making

Furthermore, stakeholder comment and regulatory development and decision making stages need to be built into the decision-making process. It could be

envisaged that following Task 6 the consultants (with guidance from the Commission) present an assessment of the following:

a) The case of whether a points-system approach needs to be countenanced or is unnecessary or unhelpful (from Step 5)
b) In the event that they consider that it is logical to consider a points-system approach they would need to report their thinking with regard to:
    c) The environmental impact parameter or parameters to be assessed via a points approach (from Step 3)
    d) The product scope (i.e. simple product, extended or modular product, or product system) that the points system would aim to address (from Step 2)
    e) The life cycle stages that would be included in the assessment (from Step 1)
    f) The assessment of the product intervention phases (from Step 4).

This could initially be presented to the Stakeholder Group for comment and subsequently to the Consultation Forum. Based on the feedback received a decision could be made by the Commission regarding whether to proceed to the conduct of Steps 6 to 10 and/or whether to amend any of the thinking regarding the choice of impact parameters, product scope, lifecycle stages and product intervention phases.

In the event that the Commission deems it is still sensible to proceed, following this consultative step then the consultants would be tasked with conducting Steps 6 to 9. This would entail reaffirming that the product reference cases are appropriate for:

- the modularity of the product determined in Step 6, and
- each pertinent application group derived in Step 7.

It would be likely to necessitate undertaking a more thorough appraisal of the product reference cases than would have initially been performed in MEErP Tasks 1-4.
Once the reference cases are clarified then the impact budgets as a function of the set of design options can be conducted as per Step 8 and a normalisation process and points award process conducted as per Step 9. The results of these analyses could then be presented to a final Stakeholder group and amended as deemed appropriate.

The rest of the process to derive Ecodesign requirements would follow the same process as is normally undertaken. The Commission would take the findings from the stages above and use this to derive a Working Document with its initial regulatory proposal via the Regulatory Development process set out in Step 10. Note that the derivation of this working document is likely to require an additional assessment of the products on the market to establish the points that would be associated with the Least Life Cycle Cost and BAT levels, as well as the Reference Cases. If points-based energy labelling is envisaged it may also be valuable to see how current products are distributed in terms of their points allocations for energy performance.

Once the working document is developed it would undergo scrutiny and potential amendment via the Consultation Forum and the Regulatory Committee, in the usual manner for Ecodesign and Energy Labelling regulations.

7. Observations on conformity assessment

The generic methodology set out in section 5 does not pose any insurmountable problems for conformity assessment, but it is inherently more complex than simply submitting a product to a laboratory for an energy performance and associated impact parameter test. If a points system is being used it will be because of the presence of non-cardinal data necessary to evaluate one or more ecodesign impact criteria, or because some blend of generic and specific Ecodesign requirements is being considered within a single evaluation framework. Thus while there will be more types of aspects to assess and there will be a need to put them within a single accounting framework (the points system) to determine compliance, none of the individual elements that go into the foundation of the points system need present any greater challenge for conformity assessment than were they being assessed as ecodesign features that are measurable purely via cardinal data.

Checklist approaches are likely to be needed to determine whether products have ordinal or qualitative design features and in principle the process of doing this can be codified into standard assessment guidelines or standards. The precise route to follow would need to be assessed on a case by case basis and determined by the appropriate bodies (Commission, standards committees and MSAs and/or conformity assessment bodies). Although the process of determining the points scores adds a layer of complexity to a standard product conformity evaluation it is not inherently more complex than the process that would already be required to assess a domestic heating or hot water system for compliance with the energy label (European Commission 2013).

8. Clarification of the rationale for the proposed methodology

It should be recalled that the structure of the methodology that has been set out in Section 5 has been consciously designed to address the requirements:

- To evaluate environmental impact parameters in isolation and not to combine them within an overall points scheme
- To ensure that the impact of design options are awarded points in proportion to their effect on the impact parameter in question
- To be as comprehensive and inclusive as possible and thereby allowing the option to extend the scheme's structure to include: the environmental impacts deemed appropriate, the product scope that is deemed most appropriate, the intervention phases deemed appropriate
- To work at whatever application grouping levels are deemed to be appropriate
- To address product modularity
- To fit within the MEErP methodology
- To work with the Ecodesign and energy labelling regulatory process
- To respect the needs of conformity assessment
- To enable complexity to be addressed.

As a consequence, the proposed methodology discards any of the impact parameter aggregation methods which have been discussed in the Task 2 report[7] of this project. However, the methodology used retains an equivalent approach to the derivation of impact parameter performance metrics, as is currently utilised in conventional Ecodesign determinations (e.g. for EEIs). It is designed to ensure that all relevant factors are considered and determined systematically, but still allows user freedom and discretion to reflect the inevitable need for flexibility. In particular, it is systematic in recognising when design options can be assessed via cardinal, ordinal or qualitative data and proposes a rigorous but fair method to assemble them within a single evaluation structure. This structure is also capable of incorporating the effect of uncertainty. The method is modular and supports modularity in all its aspects (modularity in: product scope[8]; product elements and functions; design and use intervention phases; specific, generic and information Ecodesign measures or hybrids thereof, and environmental impact parameters). This means that its boundaries can be consciously limited when there is insufficient clarity on some aspects but added to in later editions, as more information and clarity become available. It is flexible in allowing different product phases to be assessed and in allowing both generic and specific Ecodesign measures to be considered and addressed – potentially within the same points-framework at the user's discretion; it also allows the successive addition of environmental impact criteria – each treated distinctly from the others. Lastly it is as simple as can be managed to address the requirements set out above and is structured in a manner that is consistent with the needs of the MEErP, the regulatory process and conformity assessment.

It should be noted that given the rationale discussed above, none of the points-systems approaches considered in the Task 2 report (VITO et al, 2016) are directly applicable to the current need and hence they have only partially informed the development of the methodology proposed in this report. In particular, none of the impact parameter aggregation methods have been necessary, therefore. Instead, rather an amended approach was judged to be necessary, to enable the consultant/ MEErP practitioner/ policy-maker to address the degrees of (un)certainty found within successive individual impact parameter assessments.

There are some similarities with the methodologies to determine building energy performance, or heating system energy labelling, or pump energy performance (for example) but in none of these cases is there a direct corollary. In particular, the present methodology aims to be as explicit as possible in assessing the relative importance of different eco-design features towards the overall performance of a product for any given environmental impact parameters – even when this requires partially informed estimates to be derived and the impact of uncertainty to be taken into account.

9. Additional thoughts following stakeholder feedback

Subsequent to the submission of the draft Task 3 report and the associated draft Task 4 reports on the machine tools and data storage devices case studies the study team received substantial stakeholder comments. Explicit answers to the

[7] i.e. those methodologies that are intended to compare across different types of impact parameter and award points within a common framework

[8] i.e. component, simple packaged product, extended product or product system

questions posed are delivered in a set of new documents[9] but comments were also received in the form of feedback at the second stakeholder meeting and via documents that expressed views that were not related to any specific part of the text of the two reports[10]. When appropriate the final Task 3 and Task 4 reports have been amended to reflect improvements proposed in these comments. In many instances there were requests to address issues that were beyond the scope and budget of this current work – these have been acknowledged. The text which now follows is added to address the comments received in a broad manner and to present the study team's perspective on some of the key issues raised.

Terminology

Several comments were received requesting clarification of terminology. Some of these concerned definitions which are already established in the MEErP such as what is addressed by a simple product, an extended product and a product system. The terms Stage and Phase were requested to be clarified and this has now been further elaborated on in this report. The essential distinction is that stage is used to refer to the classic lifecycle stages of a product with respect to the stages they can have an environmental impact; whereas, phase is used to refer to the parts of the product lifecycle that can be targeted by implementing measures. There is some overlap but the description of phases in Table 2 is clear and distinct.

Order of Steps 1 and 2

The order of the Steps 1 and 2 in the methodology was queried. It was suggested that Step 2 addressing *Assessing the Key Life Cycle Stages* should come before Step 1 addressing *Assessment of product scope boundaries and associated impacts at the wider level*, because the scope boundaries are needed before deriving the LCA via the MEErP. We tend to agree although in reality both steps are essentially done in parallel.

Defining a complex product

Several stakeholders asked for clearer or more precise definition of what a complex product is. Instead we have chosen to list the characteristics of complex products as defined by the stakeholders themselves. This decision is partly because it is not within the project mandate to attempt to define what a complex product is, and any definition is contestable, and partly because there are likely to be aspects of product complexity that are not foreseen by any definition. Thus, it seems better to leave the definition to be more fluid, while noting that establishing such definitions is the type of activity suited to standardisation bodies. The methodology is flexible in that it directly addresses many of the aspects of complex products (modularity, lack of a stable usage profile, environmental impact performance sensitivity to application, lack of a single or well defined functional unit, etc.) but it does attempt to be prescriptive and allows users to apply their judgement within a logical assessment framework. Lastly, we note that Hans Paul Siderius has provided comments on the Task 3 methodology which include a well-articulated summation of what constitutes a complex product from an Ecodesign perspective[11].

[9] See the reports: *Task 3 stakeholder written comments with study team replies.pdf*; *Task 4 DSD stakeholder written comments with study team replies.pdf*; *Task 4 MT stakeholder written comments with study team replies.pdf* available on https://points-system.eu

[10] See the minutes from the 2nd stakeholder meeting (annex 1 of this document) and the documents: *EPEE comments - Point systems - Task 3.pdf*; *NL - Comments Task 3 Points System general - DRAFT 170320.pdf* available on https://points-system.eu

[11] See *NL - Comments Task 3 Points System general - DRAFT 170320.pdf*

Treatment of reference cases

Some comments asked for clarity in the general methodology regarding how reference case models should be determined. Reference cases models are needed in Step 8 *Determination of environmental impact budgets* and Step 9 *Normalisation and awarding of points* to establish one point on an environmental impact performance assessment scale (the other point being the hypothetical case of a product that fulfils the same function as the reference case but has no impact on the environmental parameter in question). The methodology simply requires two fixed points on such a scale to be established and thus allows freedom with regard to the exact definition of the reference case. This flexibility is necessary. For a cardinal environmental impact parameter and a product type with a clearly defined functional unit it is sufficient to see the distribution of product test results for the impact performance parameter in question and then decide whether to set the base case at say, the average on the market, or the worst on the market or some other point on the distribution. This approach was possible and applied for the data storage devices case study. For an ordinal environmental impact parameter a different approach could be required. While for an impact parameter with an undefined functional unit a very different approach is needed to establish a reference case, as was put forward for the machine tools case study. In that case it was considered to be impractical to attempt to define functional units for machine tools because they can serve multiple functions and are highly sensitive to heterogeneous usage behaviours. Therefore, the solution put forward when assessing energy performance was for the reference case to be considered to be an exactly equivalent product (to the one being assessed) but not having any energy saving technologies or features implemented. This allows a wholly different approach to be applied, and one which seems to be the only potentially viable solution, at least for that part of the machine tool market where it is not possible to define the functional unit.

Treatment of other environmental impact parameters than energy in use

The case studies in Task 4 and the example given in Task 3 address energy performance in use. Some stakeholders requested that additional work be done on other environmental impacts. This has not been done due to limitations of budget, time and data; however, the methodology to be followed for the assessment of other environmental impacts is exactly as set out in this Task 3 report whenever it is possible to derive a measure of the impact in question (whether cardinal or ordinal or a mix). For environmental impact parameters for which no kind of cardinal or ordinal assessment scale can be derived it is doubtful that any satisfactory method can be developed. In the case of resource efficiency, which was requested by some stakeholders, there was insufficient available data to derive a sensible case study for either of the two product types considered.

The balance between environmental performance and cost effectiveness

More than one stakeholder commented on the lack of economic and cost effectiveness analysis put forward in the Task 3 and 4 work. This was due to the project's terms of reference being explicit in not calling for this; however, there is nothing inconsistent between the methodology developed here and the type of life cycle cost assessment conducted in accordance with the MEErP. Such an analysis would be a regulatory requirement for the development of any minimum energy performance requirement under the Ecodesign Directive. It could be a complementary activity in the case of the data storage devices but for machine tools an adapted approach might be needed.

Treatment of trade-offs between impact parameters

The method developed is intentionally not set up to address trade-offs between impact parameters, because numerous stakeholders counselled against this. Nonetheless, in principle it could be adapted to enable this albeit that it would necessarily require the introduction of a mechanism to reflect value judgements of mandated stakeholders. The AHP method discussed in the Task 2 report is one approach but is probably overly involved for practical use in an Ecodesign regulatory process.

Regulatory and voluntary implementing measures

In principle, the methodology developed here is equally applicable for regulatory or voluntary implementing measures. This work does not attempt to establish exactly what elements could be incorporated within a voluntary agreement and how they would be enforced because this is beyond the terms of reference of the study.

Market surveillance

Several stakeholders raised the issue of the viability of market surveillance. Inherently the more factors that have to be assessed within a market surveillance process the more challenging it becomes; however, there is nothing in the Task 3 methodology that presents and specific challenges for market surveillance – rather the challenges arise because of the complexity of the products themselves. The data storage devices case study shows how the methodology can be applied in a way that can be verified by measurement on the product. Market surveillance for the machine tools case study was necessarily different and more complex. In that case a blend of measurement and management system type conformity assessment would be needed.

Decision-making processes

Some stakeholders requested clarity about the decision-making processes to be followed under the methodology. We have outlined some suggestions regarding these but this is evidently a matter for mandated stakeholders to decide upon and it is therefore inappropriate to be prescriptive on this topic. We note that while the methodology put forward attempts to make use of as much objective information as possible that ultimately value judgments cannot be avoided for some topics. Due to the existence of viable functional units and a viable data set the data storage devices case study required little additional value judgments to be made to assess the energy performance in the use phase. In contrast, the machine tools case study required value judgements to be made on topics such as the points to be awarded for items on checklists and the relative weightings to be applied. It is imagined that these determinations would initially be drafted by an expert panel before scrutiny by stakeholders and validation/rejection within either the Consultation Forum or Regulatory Committee; however, this is just an illustration of the considerations with respect to the decision-making process that are likely to encountered for the application of a points based approach for complex products.

The value added of a points system approach

The topic of whether there is any value added in the points component of Step 9 concerning Normalisation and awarding of points was raised by some stakeholders. Strictly speaking the normalisation component is required but that could be sufficient in itself to derive a viable ranking of product performance and it is not necessary to then convert the normalised values into points to have a workable system. The conversion into points may make the scores more accessible to market actors and would also facilitate comparison between impact parameters if this were to be attempted in a future evolution of this method. Otherwise the main added value of the

methodology put forward is that it articulates and addresses the issues necessary to allow the assessment of the environmental performance of complex products.

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Annex 1: Minutes second stakeholder meeting

2st stakeholder meeting "Technical assistance study for the assessment of the feasibility of using "points system" methods in the implementation of Ecodesign Directive (2009/125/EC)" Hallstein Room, Berlaymont, Brussels, 10/03/2017, 09.30-17.30h

Participants

The Commission:

- Michael Bennett (DG GROW);
- Davide Polverini (DG GROW);
- Veerle Beelaerts (DG ENER);
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- Jiannis Kougoulis (DG ENV)

Project team:

- Paul Waide (WSE);
- Jan Viegand (VMAS);
- Clemens Rohde (Fraunhofer);
- Tim Hettesheimer (Fraunhofer);
- Karolien Peeters (VITO);

Stakeholders (in alphabetical order of family name/ first name):

- Barillot Thomas (Digital Europe);
- Blankemeyer Hanna (VDMA);
- Broos Alexander (German Machine Tool Builders' Association (VDW));
- Dardenne Jo (Member of EVIA Secretariat (European Ventilation Industry Association));
- Dugdale Joshua (Manufacturing Technologies Association);
- Dürer Jörn (CETOP (European Fluid Power Committee));
- Ebert Thomas (Apple);
- Fagerlund Kirsti Hind (NVE);
- Fayole Chloe (ECOS - ecostandard);
- Frank Sebastian (TRUMPF);
- Geerts Filip (CECIMO);
- Geigerich Jens (Vorwerk Elektrowerke GmbH & CO KG);
- Haendel Claus (Technical Secretary of EVIA (European Ventilation Industry Association));
- Hernandez Maria (Sony);
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- Maigret Aline (BEUC);

- Mailleux Félix (CECED);
- Oki Takahiro (EPEE);
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- Patra Martial (CEN/ CENELEC overall Ecodesign/ Schneider Electric);
- Pathmanathan Durca (Daikin Europe);
- Presutto Milena (ENEA);
- Rateau Fanny (EHI);
- Ralf Reines (ISO/ TC 39/ WG 12 re. ISO 14955/ VDW);
- Rimmer Edward Michael (DECC UK);
- Schiansky Jethro (Vorwerk);
- Scuderi Fransesco (Eurovent);
- Siderius Hans-Paul (RVO);
- Soenen Bram (Ministry of Environment – Belgium);
- Strada Carlo Alberto (Eumabois);
- Suffys Tristan (Eurofuel);
- Toulouse Edouard (Independent consultant, assisting ECOS);
- Vyrobal Jiri (SST - Association of Engineering Technology / RCMT (Research Center of Manufacturing Technology));
- Wagner Sarah (Digitaleurope);
- Whittaker Bryan (BT connect);
- Wiik Carina (Teknologiateollisuus);
- Yuste Prieto Marta (CECED)

Agenda

1. Opening – Introduction to the study and quick summary of the object of today's meeting (DG GROW)
2. Presentation of draft Task 3 report – Proposed generic points systems methodology (Consortium VITO - Waide Strategic Efficiency Ltd–Viegand & Maagøe–Fraunhofer ISI–VHK)
3. Presentation of draft Task 4 report – case study of generic points methodology applied to Data Storage Devices (Consortium VITO - Waide Strategic Efficiency Ltd–Viegand & Maagøe–Fraunhofer ISI–VHK))
4. Presentation of draft Task 4 report – case study of generic points methodology applied to Machine Tools (Consortium VITO - Waide Strategic Efficiency Ltd–Viegand & Maagøe–Fraunhofer ISI–VHK))
5. Analysis, discussion and exchange on "Task 3 - generic points system methodology" (all)
6. Discussion and exchange on "the Task 4 – Data Storage Devices case study" (all)
7. Discussion and exchange on "the Task 4 – Machine Tools case study" (all)

8. Presentation of implementation issues (Consortium VITO - Waide Strategic Efficiency Ltd–Viegand & Maagøe–Fraunhofer ISI–VHK))
9. Discussion of implementation issues (all)
10. Next steps
11. AOB

1 Opening – Introduction to the study and quick summary of the object of today's meeting (DG GROW)

Welcome by DG GROW (Michael Bennett):

The objective of today is to gather your comments on the task 3 and 4 reports. Based on these comments the reports will be revised.

This meeting is not about ecodesign measures for data storage devices and machine tools. These two product groups have been chosen as case studies because they are typical complex products.
Based on the findings of these case studies (task 4 reports) and the stakeholder comments we will identify if we have to revisit the methodology proposed in task 3 (first attempt to create a points system).

The next steps will be to review the task 3 and 4 reports and to start the additional task 5.

2 Presentation of draft Task 3 report – Proposed generic point systems methodology (Paul Waide)

Paul Waide presents the Task 3 report

From the review of techniques in Task 2, we found only a few elements that are applicable for a points system method for use in the implementation of the Ecodesign Directive. This is because of the very specific remit that such an approach needs to fulfil, if it were to be used to help design and implement Ecodesign policy measures. Therefore it has been decided to develop a logic that is driven by the stakeholder feedback.

Summary of stakeholder feedback: see slides 2nd stakeholder meeting.

Paul Waide presents under which circumstances a points approach is merited and the factors to consider in the design of the methodology: See slides 2nd stakeholder meeting.

The case studies revealed that parts of the Task 3 report have to be amended. Currently the method does not deal with weighting impact categories, to result in any amalgamated scoring concept(s). However, this could be an option in the future, depending on the case-specific use of the proposed method, in conjunction with taking note of case-specific stakeholder feedback. The focus on the case studies is presently still on energy, but the same approach can be used for other impact parameters. The method is extendable.

Paul Waide then presents the proposed methodology, a 10-step process. He illustrates the linkage of the generic methodology to the MEErP and to the Ecodesign process, and gives a clarification of the rationale for the proposed methodology: See slides 2nd stakeholder meeting.

3 Presentation of draft Task 4 report – case study of generic points methodology applied to Data Storage Devices (VMAS)

Jan Viegand presents the findings of the case study on data storage devices: See slides 2nd stakeholder meeting.

The aim of the case studies is to apply the theoretical approach to specific product groups. As a general feedback comment, it can be said that it was difficult to perform the Data Storage Devices (DSDs) case study, and to apply the methodology meticulously. Several substantial reporting iterations were also required, regarding the draft report. The DSDs draft report is on the website and we look forward to receiving your comments.

A data storage device is a product which is placed in a data centre, consisting of servers, storage equipment, network equipment, short-term backup and data centre cooling. There are five main components responsible for energy consumption and environmental impact. The data storage equipment itself contains storage media, storage controllers, network interfaces and software. The devices in scope for this case study are defined as 'Online 2, 3, 4'.

The environmental impact of data storage consists of the energy consumption of product per se, together with the infrastructure in the data centre: the network, the Uninterruptible Power Supply (UPS), and the cooling necessary for data centre temperature control. The energy consumption of these three components increases in line with the overall energy consumption related solely to data storage. As the consultants principally responsible for the DSDs study, we used data from other studies which had been previously carried out to derive other energy consumption figures. It is important to note that the energy consumption of data centres is still increasing, and the expectation is that it will double by 2030. Hence, it is desirable to ameliorate these effects as far as possible, e.g., by better design of the individual products and systems.

A points system could be applicable to data storage products because there is a mix of quantifiable and qualitative product ecodesign features. In addition, it is difficult to translate each ecodesign feature into a regulation, and it is complex to apply a rigorous performance assessment method. Therefore a points system provides a compromise for an improved ecodesign product.

Existing regulation and schemes comprise: DG GROW Lot 9, the ENERGY STAR, SNIA (Storage Networking Industry Association) Green Storage Initiative and ASHRAE (the American Society of Heating, Refrigeration and Air-Conditioning Engineers). Note that especially ENERGY STAR and SNIA are important for this study.

Jan Viegand emphasises that this case study is an illustrative case study, and it is certainly not a final proposal. Existing (limited) data have been used (the dataset available from ENERGY STAR), and assumptions have been made regarding some parameters. The proposed weightings are based on the use of engineering/ expert judgement.

In the case study, the different steps proposed in the Task 3 methodology have been followed, and may be consulted in the accompanying slides: please see Second stakeholder meeting slides.

To assess step 7, the assessment of the implications of the product, freely accessible data from ENERGY STAR have been used. The Energy Star data consists of 289 data fields. A finding from the case study is that it can be said that the data allow for good conclusions at this stage; however, a lot of analyses had to be carried out on the Energy Star data, e.g., the necessity to perform "data washing". One data treatment is that the 10% highest performing products have been excluded for some of the analyses. This is a choice that was made, to attempt to gain a more representative sample, overall, of the devices most frequently used. However, this statistical data treatment is not important for understanding the fundamental methodology used.

Regarding step 8, COMs (Capacity Optimisation Method), it has been assumed that deduplication, thin provisioning, delta snapshots and compression are applied, in order to obtain points for a more effective product. This is solely an assumption, and should be further developed. The improvement of ecodesign options 1-5 are the project team's estimations of how much the energy budget should be improved. Subsequently, inverting the total performance regarding the overall energy budget requirement has been applied, so that the most efficient product gets the smallest number.

A calculation guide is included in slide 44 (see slides second stakeholder meeting).

Jan Viegand shares a few thoughts on market surveillance.
There are three levels:

1. Technical documentation: this is applicable to all ecodesign measures. This is quite effective for market surveillance. One often discovers a number of errors in supporting technical documentation.
2. The next step is to recalculate, as a check. One has the public data, and if one also has the manufacturer's data, it is possible to recalculate the claimed results, via applying the method.
3. Take the product and actually test it. This has the disadvantage that it is more expensive. However, there is a specific recognised test program.

Good commissioning guidance is another option, and one where points could be suitably allocated, in addition to solely product design per se. However, this will need discussion, and it partly involves subjective judgements.

Conclusions from the case study:

- Viegand Maagøe thinks that it is possible to refine and develop it into a real points system;
- More test data for a varied selection of data storage are needed;
- There is a need to look more into the weightings, e.g., of the COMS techniques, of course, to be undertaken together with industry input, and incorporating expert judgements.

4 Presentation of draft Task 4 report – case study of generic points methodology applied to Machine Tools (Fraunhofer)

See slides: Second stakeholder meeting

Overview remarks: Michael Bennett, DG GROW

Michael Bennett makes some overview remarks before lunch:

- Although the Task 4 case studies, and even the Task 3 report highlight that the points systems are very complex, one may think of the detailed design of the elements a little like using a mobile phone. I imagine that most of us may not understand all the hardware and software, the applications and the satellite technology behind what we now use on a daily basis, but we are able to somehow use it, and we are glad that it is there.
- Some of these more advanced systems might be useful in the future even though they seem quite complicated. The "back office" complexity is necessary to address the problem, but should not hinder its real-world application to actual product design problems and checks, such as market surveillance, client-manufacturer contractual relationships, etc.
- However, the Task 4 examples highlight the importance of the fact that the points systems must of necessity be capable of being interrogated or drilled down into by interested partners, be they industry, machine tool builders or market surveillance authorities … so the results can be cross-checked or proven. We cannot work with a "black box" approach - we have to be as transparent as possible.
- None of these elements are more complicated in genesis than typical hierarchical decision-making techniques. Ecodesign is about making a difference, not about making the most thorough environmental profile exercise ever. Ecodesign should not go into endless detail, but sufficient detail so that product improvement recommendations can come out of it.

5 Analysis, discussion and exchange on 'Task 3 – generic points system methodology' (all)

Stakeholders are now given the opportunity to raise comments and ask questions about the draft Task 3 report.

Bram Soenen asks if the method allows to add features, or innovative options. For example, it might not be applicable to disruptive/ innovative design. Moreover, Bram Soenen asks about market surveillance. If market surveillance authorities have to verify the modelling or calculation of points, it could be that errors are made or that Member States' market surveillance authorities and manufacturers disagree. On a related issue, has an estimation of the susceptibility to, and calculation of error propagation been made?

Paul Waide answers that both case studies look at the currently known state of knowledge regarding the products addressed. The data storage devices case is based on an existing database (Energy Star), and thus a scale is set which references the presently-known Best Available Technology ("BAT"), for example. The machine tools case instead re-examines and defines the design options under any specific new phase of the duty profile. To do this, some sort of library should be available. If the disruptive type of technology occurs in the data storage case study, one can adjust the known "BAT" scale as soon as the technology is tested. In the case of machine tools, one would have to have a process to enable the review and revision of the list of options. We do not have an impartial database which clearly defines the functional unit for machine tools, unfortunately, in the way that we have information describing what it available for data storage devices. The approach taken for machine tools instead gives the manufacturer the freedom to state what the machine tool does, via

describing its features, properties and capabilities. It was not possible to externally define the functional unit for machine tools. For the machine tools case, innovation should be included in the list of available options.

Clemens Rhode answers that tolerances and errors are of course a problem, especially when one works with ordinal scales. It is, to some extent, subjective. There are two factors to be considered. One is the fact that it is a multi-criteria approach. This type of approach is to a certain extent tolerant to errors. It is satisfactory to be a little uncertain on a single indicator, as it will most likely level out, since one is taking the average of many factors. The second factor is that it is actually not a technical question, but a political question. Politically you have to decide how much error one would allow.

Paul Waide completes this discussion by adding that, in principle, one can perform an analysis that checks how the error propagates, e.g. with a Monte Carlo approach.

Bram Soenen remarks that he still thought that it was unclear if features such as the throughput of a machine are evaluated somewhere in the analysis, particularly with regard to machine tools.

Clemens Rhode answers that throughput is something we actually don't look at; it is not a variable that's being considered. We compare a machine tool to a better and worse version of itself. It is more a variable we consider in Step 1, but not in the stages where we look at the impact. Bram Soenen asks if it is then possible that two different machine tools, where one machine tool has only half of the throughput of the other machine can both end up with the same score? Clemens Rhode answers that this could indeed happen, but that this would be an extreme hypothetical case. This is actually part of the design process, and a proper, thorough design process should prevent such a case. If we would compare machine tools based on throughput we are again struggling with the functional unit issue, which is related to duty cycle(s). If the (several) duty cycle(s) and the rapidity/ throughput requirements could be successfully defined, and then related to the design options being considered, then that would enable the two issues to be addressed.

Hans-Paul Siderius mentions that this study should actually come to a kind of structured and simple way of dealing with the issues that came across: Modularity, duty cycles, innovation in functions. He states that his general problem is that he has not yet seen a relation between these issues in the general methodology and the solutions for it. I think the solutions will be broader than those that are currently used. It would be good if the team could think a bit more about the structure.

Hans-Paul Siderius also mentions a few more specific points. He thinks that a different interpretation of the use phase is being used. In the MEErP methodology, the energy consumption during use is an impact of the use phase. This is of course influenced by the design and so on, but it is allocated to the use phase. In what the team has presented, he regards things as being shifted around to some extent. His request is to bring this in line with the general ecodesign methodology.

It is proposed to make the decision to use a points system in MEErP Task 5. Hans-Paul Siderius thinks it would be useful to make this decision earlier in the steps of the typical MEErP process. It can already be assessed in the quick-scan step ("Task 0"). If the decision is made only in MEErP Task 5, one might have to redo the earlier steps.

Takahiro Oki (EEPE heating and cooling ventilation) remarks that the points system only looks at the environmental aspect. EPEE believes that economic aspects have to

be taken into account. There is a sentence at the end of the report stating that LCC aspects have to be taken into consideration in a later stage. Oki Takahiro asks how this will be done and how will synergies be created? A second remark relates to the aspect of market surveillance. Certain design options will get certain points. The actual points a design option gets depends on how it may be aligned. We find this in the machine tools study, where a table considers where 0 to 5 points are to be allocated. The system is looking at the design options, while the current methodology looks at energy efficiency. How can market authorities look at design options to see whether a product is fulling the points or not? This is quite subjective and requires further clarification.

Paul Waide answers that the economic aspects would be determined as an additional parallel step. It is referenced in the study, it is spoken about, but it is a parallel thing to be done, it is not part of this study. Michael Bennet reinforces this, i.e., that the economic aspects are outside the agreement of this project.

Clemens Rohde answers that market surveillance of a points system would be different. It is not so much about the final energy consumption. It will be required to look at the design materials, all the files and whether there are measures to be implemented. It is much closer to an auditing process than a classical measurement of the product.

Edouard Toulouse remarks that in the points system there are two really critical aspects: the first one is weighting, and the second relates to uncertainty. He would expect that they would be very much discussed and elaborated on in the report. If one has a scoring that involves nominal data, how would one weight that into an overall score when it is mixed with ordinal or cardinal data. This needs more clarification. How will the panel of experts decide? This can lead to long discussions. In addition, the overall uncertainty of a points system method is not much discussed. The uncertainty can accumulate and the final score can have a very high uncertainty. This is missing in the study. The methodology should always entail a step that evaluates the uncertainty. There is a formula in the report for ordinal data that can be uncertain. The score can be discounted in a certain way. Where does this formula comes from? Here it would be good to compare how this issues have been dealt with in other methodology. You have not referred at all to the findings of the methods reviewed in Task 2. You could check how these methods deal with uncertainty, weighting and ordinal data.

Edouard Toulouse further mentions that throughout the whole report, it is assumed that the methodology will be used in hard regulation measures. Voluntary agreements from the industry are not considered. This is often the preference of the industry, and even of the Commission. If the industry comes with a voluntary initiative, what would be the way to go forward? What are the minimal conditions for a point system to be acceptable in the context of voluntary agreements.

Paul Waide answers that indeed the report could discuss more the issue of weighting and uncertainty. However, this easily gets prescriptive and we were counselled not to get overly prescriptive in the previous stakeholder meeting. We can include this as long as they are understood as suggestions and not a firm recommendation. This methodology acknowledges it and it requires you to flag up when you are dealing with different level of quality in data. The points systems referenced in Task 2 deal very non-transparently with uncertainty. None of the systems in Task 2 comes up with a systematic treatment of uncertainty. Often they come up with panels, and for most of the points systems it is not clear and transparent how the panels work.

Paul Waide asks: Regarding the implementing measures and voluntary agreements, isn't a voluntary agreement just one type of implementing measure, and doesn't the study reference implementing measures rather than just regulations? Paul Waide explains that he will check back on the wording used and address this point if the current wording is inadequate. It is not clear we will have the resources and time to address your question on the minimum requirements necessary for voluntary agreements, but things of that nature have to written up as being worthy of future investigation as a minimum.

Jan Viegand adds that for the data storage we could elaborate on the weighting, however it will be different from case to case. For the servers, the process was via technical standards that came up with a metric, also based on some workload standard code. Some work has been done to come up with one metric (weighting).

Michael Bennett answers that we can take up the comment on voluntary agreements. It is the objective that the proposed methodology is equally as applicable to voluntary agreements as it would be to potential regulatory measures. This is maybe a bit lost in the detail of how the reports have been presently compiled, but the work the consortium did is equally applicable in both cases. We have to extract this a bit more in the report. Michael Bennett agrees with Edouard Toulouse that we need transparency on the weighting procedure and the representativeness of the panels.

Michael Bennett mentions that we should come back to market surveillance. As a general point it might be easier to apply to voluntary agreements. We also have to come back to the uncertainty point and possibly revisit Task 2.

Hans-Paul Siderius thinks there is some confusion on uncertainty. There is the uncertainty on a measurement, but uncertainty was also used when talking about the impact of giving user information or a general design check or within data storage product, if the data storage product uses less energy there is an impact on the air conditioning. With the second type of uncertainty we should be very careful to go too much into the uncertainty discussion. This goes into things the manufacturer cannot control. Ecodesign is about what the manufacturer can control. Please treat the two types of uncertainty differently and not together, and be more firm on the aspects the manufacturer can control.

Jan Viegand agrees with what Hans-Paul Siderius said. It concerns all products; you never know how people will treat a product. It must be acceptable that there is some uncertainty on this.

Davide Polverini comes back on the point for data storage. What has been shown provides an effective tool to rate the energy efficiency of the products. He agrees that some features are not detectable at the point of placing on the market (e.g. capacity). However, one can - at the moment of placing the product on the market - investigate the capability of the system to do so, and then base the judgement mostly on the capability, rather than solely on what has been proven.

Michael Bennett adds that we can for example give some points on the ability to get access to some components. With ecodesign we can only control how the product is placed on the market, not how it is used and certainly not in advance regarding its second life.

Francesco Scuderi asks to clarify which products are to be considered as complex products. The definition of a complex product is quite wide. Regarding Task 4, if this methodology is going to be applied, it is important to understand the boundary

conditions. Manufacturers do not know the duty profile, they don't know where and when the product is sold and what the typical use is. How to assess the market surveillance in this way?

Michael Bennett explains that in the Task 3 report, generic considerations have been given on at what point you can say that something is complex or not. The Commission asked to define a logical process helping you to decide whether a product is complex or not.

Paul Waide answers that defining the duty profile is always a challenge, even for the simple products. We were confronted with this when applying the Task 3 methodology in Task 4. If one can define a sufficiently stable duty profile, then this is what one should use. In the case of machine tools this wasn't possible, because there are far too many possibilities. We fully accept this. However, manufacturers are far more aware of what the duty profile will be than anyone else, apart from the client. The market surveillance process, in that case, is based on an audit approach where one takes the duty profile proposed by the manufacturer. Whether this is right or wrong is of course an open question.

Durca Pathmanathan says that after reading the documents, the general impression is that the methodology and its application is not really clear. The definition of a complex product needs to be reviewed. The following three remarks on the definition are given:

1. It is too vague: It is understandable that making a very specific definition is difficult. However, this definition is complicated and it is laborious to define if a product is complex or not. There is a list of characteristics, but does the product have to correspond to one of the first 5 points or the two last points or to one of the seven points? The 1st and 3rd point seem to be similar. If a product does not provide a standard configuration it is a customized product. What is your definition of a standard configuration?
2. The terms are not restrictive: the definition will be clearer if you try to restrict.
3. No clear difference is made between a complex product, an extended product and product systems. The distinction is hard and the boundary seems to be thin. The definition of a product system should be put into the definition of a complex product. This is because a product system is an extended product. The first two points of the definition of an extended product are in the definition of a complex product. There is an overlap and this needs to be clarified.

Paul Waide answers that the consortium went through a similar process of thinking. We were warned not to be too proscriptive. We tried to be distinctive, but we will look back if the lines are blurred. The methodology doesn't lay down the law at exactly which point you have a complex product. There is a judgement to be applied. This goes beyond the objectives of the project, but we can certainly try to tie up the conclusions and steps to get there better.

Milena Presutto acknowledges that it is important that this study has been done. In the end we will know if the points approach can be used or cannot be used. It stimulates the discussion on the future of ecodesign. However, what is the added value of the points system compared to the current system being used? We already apply a weighting, we apply a certain type of correction or correction factor e.g. to thermostats in boilers. Do we need a points systems to give an added value to what we are doing? I don't currently see any added value. First of all, it is not a points system because of the indicated way of scoring. There is too much uncertainty. Market surveillance will be different, but must be feasible. An audit on manufacturing options

is not feasible. You cannot imagine going to e.g. India for assessing manufacturing options.

Milena Presutto further asks how representative the user scales are? How much uncertainty is there? They are not representative at all or only partly representative of the product that we are investigating.

Milena Presutto adds that currently she sees the use of the system as an ex-post engineering calculation to assist in understanding the potential savings achieved by the very simple ecodesign requirements that are set for a product. Part of this work can be also included in the current work (e.g. in Task 5 or even in Task 0), in order to understand the relation between usage pattern and possible ecodesign requirements. Another application could be the internal audit of a manufacturer. In addition, she comments that the consultants should not say 'we believe that market surveillance is possible'. Rather, they have to prove that market surveillance is possible.

Bram Soenen agrees with what Milena Presutto just said, i.e., that in part we already use points system approaches. A second point is with regard to voluntary agreements. It is worthwhile considering that separately, because the ways of administering the policies are different. There is an overall obligation for manufacturers to comply with something, which is not model specific, but instead is a fleet approach, and there is an additional layer of internal surveillance by the voluntary agreement organisation itself. A third comment is on the uncertainty. There is currently a Product Environmental Footprint ("PEF") project going on and there is an LCA handbook related to that. Via this handbook, there must surely be guidance on how to assess data quality for life cycle assessment. This approach might help, and could be implemented somewhere. A fourth point is on material efficiency. There are some examples in that field as well of points systems where there is some value judgement of several options to improve material efficiency of products. That could be an interesting field of application for a points system. Then as a fifth point, I read the conclusion in Task 3 report that there was a consensus not to look into weighting. If we are going from energy efficiency to material efficiency, how will these two be combined? This could be done by a two-dimensional analysis by translating impact from fuel and kilograms into kg CO_2 eq. A weighting proposal for such a trade-off could be interesting.

Michael Bennett comes back to the point on uncertainty and regarding life cycle assessment. Some of the approaches could be drafted across to the MEErP. It is a good point to take on board. He also answers the point raised by Bram Soenen on weighting. If we are now going to take the MEERP or ecodesign to another level and look at material efficiency, reparability, expected life time of products, we need a slightly more sophisticated approach with the MEErP.

Michael Bennett answers the point raised by Milena Presutto on the added value of a points system. If we could for example in case of the washing machines, instead of just imposing one or two "typical" washing machine cycles as "typical duty cycles", were to add a few complicated angles based on statistical analyses of real use frequencies by consumers, we would be making some real and useful progress, i.e., we could build in the areas that we miss by standardisation. One of the real key elements where the weighting and points systems could be used is where we try to cope with a better reflection of real-life situations.

Paul Waide answers the question of Milena Presutto on the necessity of a points systems. When you go into this you don't have to come out with a points system. You could stop at percentages, you don't have to have weighting. It doesn't have to go down to any final calculation of points, as long as you have a logical framework and

structured approach. The decision made in the previous stakeholder meeting not to focus on several impact categories removed the necessity to have a points approach.

Michael Bennett uses the examples that "bonus-malus" schemes related to refrigerants in some Ecodesign product groups, or a more sophisticated control device associated with heating products are "points systems". Although the consultants' report states which procedure one would have to go to then justify the use of a points system and ultimately have a weighting panel, to date this has not been done in any rigorous way with regard to Ecodesign Directive product groups. One of the weighting panels we could think of is the Ecodesign Consultation Forum, and/ or via the stakeholder meetings, during the Preparatory Study phase, per product group.

6 Discussion and exchange on "the Task 4 – Data Storage Devices case study" (all)

Edouard Toulouse poses two questions that cover both case studies. In Task 3, and in the two Task 4 case studies you only focus on energy in the use phase and you explain that the methodology can easily be replicated to other environmental criteria. Edouard thinks that it is unclear that it is so easy. Resource efficiency has other difficulties than energy in the use phase. It might have been better if one case study had been on energy use, and the other one, for example, on resource efficiency. If we wish to develop a points system on resource efficiency, how would one do this? E.g. how does one give a score to the use of recycled plastic? It is not so straightforward as for energy use.

Edouard Toulouse adds that a second question is that from his understanding, the machine tool case study is really a genuine case study on points systems. However, the data storage case study is not really a points system. Only at the very end is the index turned into a score, but one can also just use the energy efficiency and set a minimum requirement on it. Sometimes a points system might not need to be the best way forward. This should be made clearer in Task 3, i.e., that what has been done is broader than just assigning points - it is a method to deal with complexity.

Takahiro Oki raises a general question. We see that in Task 4 points are given, but what if tomorrow there is another innovation? The design option coming from innovation cannot be accurately mentioned in the report, as it does not yet exist (at least publicly). How do you propose to account for this in the methodology? This is especially relevant for products with many components that can be changed.

Jan Viegand answers the question from Edouard Toulouse on the fact that we only treat energy in the use phase. It is a good comment, but we follow in general the comments submitted, and from attendees at the first stakeholder meeting. It was also partly due to the resources available for the contract duration/ budget, the basis of the data and previous work. We had to concentrate the resources on the development of the points system.

Jan Viegand explains that the data case study is a real points system. One combines various measures (efficiency and performance) into one figure. He explains that it is possible to take innovative measures into account. This would be done via the basis that we have regarding the various performances and features. Thus, we could also cover some other options, but within the same type of performances and features.

Clemens Rhode shares additional thoughts on the question on innovative measures. It is possible to include innovative measures in the approach. The machine tools study sets the upper and lower boundaries. One could include a proxy measure. One would then have the freedom to apply this measure to a certain extent, if good proof could be provided. Via such an approach, one can of course not cover a really disruptive innovation. However, with a list that is not really fixed one can still insert various degrees of flexibility.

Paul Waide comes back on the issues raised by Edouard Toulouse and agrees that we do not really have to end up with a points system. But at least the study includes a way of thinking through the process systematically. Paul Waide further explains that covering material efficiency is possible to a certain extent, especially in the DSDs case study. However, given the budget and time constraints that we have, this will almost certainly have to go to the future "to do" list.

Martial Patra raises a general comment related to usability of the points system method. The Task 3 report states that the points system methodology should be compatible with the existing ecodesign methodology. He thinks that stakeholders should be involved more deeply in the preparatory phase, because of the points system methodology. Complex products in fact are well known by the manufacturers, system integrators and their end-users. Until now, stakeholders have been involved, on a product-specific basis, during the stakeholder meetings, the Consultation Forum and through the process of submitting written comments, together with the exchange of answers. However, the basic methodology could be adapted in order to involve stakeholders more.

Durca Pathmanathan asks if the definition of the reference case can be clarified. For example, in the machine tools case study, the reference case is not the product representative for the average energy performance on the market, whereas this is the case for the data centres. For machine tools, instead the reference case is defined as the design option which has none of these energy saving features. Hence, why is it that the points calculated in Stages 1 and 3 are not used for the final calculation? For Stage 1 you state you have 58 points, whereas in the final calculation you cite 46 points. Could you please offer clarifications/ explanations for this?

Paul Waide answers that indeed there is a difference in defining the reference case between the two studies. However, all one needs for any "points system" are two points on a scale, which delineate a lower point and a higher point. Once the lower and higher points are set, one can define a scale. It doesn't really matter what the reference case is (e.g. market average, worst on market, etc.) as long as it allows a scale to be established that treats all products fairly. We will amend the text to make this clearer in the revised Task 3 draft final report.

Clemens Rhode says that the first and third stage points should be used in the final calculations. It is solely an editorial error which the contractors' consortium will rectify in the subsequent re-draft.

7. Discussion and exchange on "the Task 4 – Machine Tools case study" (all)

Alexander Broos raises the issue of productivity. The decision of buying a machine tool by a customer follows its productivity, at least regarding certain properties, if the customer has a certain use in mind. However, often this is not the same as what the

designer has in mind. The designer will design the machine based on some boundary conditions like speed, cutting power, etc. Often, he claims that the designer cannot know what the user has in mind.

A second point Alexander Broos raises is that defining a duty profile is always dependent on the workpiece. It is easy to calculate the throughput for specific machines for e.g. the production of car components in the automobile sector, but this is not the case for "universal" (i.e., general use) machine tools. It depends on many issues, inter alia the workpiece material (various metals, etc), the geometry of the cutting, quality issues, etc. Hence, the duty profile will always be based on assumptions for these general cases, when one uses it in when applying this method. Making assumptions that do not match reality is not advisable, and secondly being judged on these assumptions is even worse.

A third point is the complexity of real-life situations. If we consider today's PowerPoint slide with all the different design options, how much burden do you wish to put on a machine tool producer to assess all these design options? It has to be possible for the industry to undertake, and also for market surveillance authorities. In his opinion, it is almost impossible to bring this method into real application.

A fourth point is that we always focus on energy savings. However, we are also talking about industrial production and keeping revenue and jobs in Europe. We should be interested in addressing overall increases in energy consumption, of course, by instead being more efficient per work piece. It is too short-sighted to look just at the kWh consumed per machine. One machine can be twice as productive as another one, and this cannot be judged based on the kWh used.

A fifth remark is that at no point do existing (ISO) standards state that there are any predefined saving potentials for any measures. It is not possible to claim numbers for individual measures. The existing draft method tries to make everything individual (customised), but by making it so individual it makes it poorly applicable for regulatory uses.

Edouard Toulouse says that CECEIMO had previously developed a voluntary agreement. He asks the consultancy consortium - could you quickly compare your proposal with their proposal?

Alexander Broos answers that what we see here and what we have presented in the previous CECIMO voluntary agreement (VA) are quite similar. If one thinks of the way in which the product is structured, there are not so many options. Unfortunately, it was almost impossible to implement the voluntary agreement, because of the exact nature of transforming the technical issues into application with reasonable effort for our companies. And another issue was the 80% of market coverage that trade associations etc have to prove, according to the European Commission's Ecodesign Guidelines re. VAs, and we never managed to achieve this via our membership.

Michael Bennett replied that his understanding via the historical and ongoing communication with CECIMO was that it was the 80% market take-up that was the unworkable aspect, rather than the technical elements. This points systems proposal might be useful for the evolution of CECIMO's voluntary agreement, if you were able to apply it.

Clemens Rhode recognizes that we are dealing with complex products, and that methods may be complex to put into practice. But with the help of tools, a lot of the complexity could be taken out of the assessment process.

Clemens Rhode also answers the question raised regarding the duty profile and productivity of machine tools, and acknowledges that these are issues. He responds that the consultancy consortium couldn't really cover productivity, because it bases the analysis on the classical concept of the functional unit. Productivity is, however, covered by the market itself because it will be considered by the consumer. It is not part of the methodology. The designer might not have a specific duty profile in mind, but there is probably a reasonable range of duty profiles. Uncertainty of the duty profiles is however a point that we have to look at into detail. The duty profile has a big influence on the results.

Ralf Reines says that the document refers several times to the standard for machine tools and gives the impression that the method developed in the standard is applied here. However, he states that this is not the case. The only element(s) that the consultants have taken from the existing parts of the ISO standard are the informative annex.

The existing ISO informative annex has 170 design options. In the consultant's machine tools case study you have dealt with 6 design options. I would be very happy to see a case study dealing with all the 170 design options of a machine tool. It would take months, and he states that a software tool would not help. From my perspective, I send a strong signal to the Commission that we are willing and able to support developing a system to assess the method we have developed, and it would be fine that we were mandated to do so.

Hanna Blankemeyer raises a question on the section on credibility and market surveillance. The consultants allocate points for trying to document well the efforts put into implementing measures. A factor 1 is given to self-declaration, a factor 2 for providing documents and 3 for third party verification. Why is a self-declaration less valuable? How did you come to this valuation?

Tom Lock has a general point about the presentation of the two case studies. They are structured quite differently. Standardisation of the way of working might contribute to the readability - and subsequent potential use - of the reports.

Clemens Rhode answers the question on self-declaration. The weighting factors are only applied for Stages 1 and 3, for the more procedural aspects. The rationale behind this is that it might make a difference if one is able to provide some kind of concrete proof, that is easily verifiable. This is a common process for auditing procedures. If something is externally audited, it is frequent to assign another higher quality to it.

Clemens answers Ralf Reines' comment and agrees it would be very interesting to have a fully worked-out example. However, it would require more work than we were able to invest given the budget and timeline of the current project.

Bram Soenen says that the machine tools case study illustrates the level of complexity that we are dealing with. Maybe there is a solution via voluntary agreements. There is also a mandate out on welding machines, and legislation on transformers. Maybe it might be worthwhile to look at certain processes, and types of machine tools to simplify the array of products being addressed.

Edouard Toulouse notes that there are quite a lot of critical comments on the machine tools case study. It could be useful to distinguish between a points system that would support a labelling tool and a points system used only for ecodesign minimum requirements. If one is trying to have an information tool, such as a label that would

give a score for the whole machine tool market and would facilitate comparisons across the whole market, then indeed one has to take into account the 160+ options. Hence, in his opinion, probably labelling is not possible. If we come to ecodesign requirements, the points system can cover a portion of the options. We do not need to address everything, and the score does not necessarily need to be 100% public information. As the distinction has not been made, we are mixing the discussion.

Ralf Reines answers to Edouard Toulouse that the 160+ options cannot be applied to all machine tools. We cannot take an excerpt of only the 20 or 30 most applicable options, in his opinion. This is because the product group is too heterogeneous. Thus, one cannot say that there are common features, since one cannot apply one single option to all the machine tools.

8. Presentation of implementation issues (Paul Waide, Jan Viegand, Fraunhofer)

Jan Viegand presents slides on market surveillance for the data storage case – see slides data storage case study.

Davide Polverini adds to the presentation of Jan Viegand that he finds the presented solution an interesting solution and he thinks market surveillance is feasible. Of course, it must be underlined we need to work out remaining elements regarding this issue.

The slides for the machine tools case study on market surveillance have been presented already under point 4 – see slides machine tools case study.

Paul Waide presents slides on Implementation issues – see slides second stakeholder meeting. These slides discuss where in the ecodesign process one could implement the go/ no-go assessment. Also the comment of Hans-Paul Siderius has been noted, and therefore the team of consultants will investigate again whether it should come in MEErP Task 0/ Task 1 or Task 5.

9. Discussion of implementation issues (all)

Edouard Toulouse comments that for voluntary initiatives the steps might be different. Industry might come with a proposal earlier in the process, which maybe might already include a weighting, methods on how to deal with measurement, and internal market surveillance. How do we assess this? Should we still have a panel of experts? Do we trust the initiative, and on what grounds? As regards the weighting and the way to deal with different data, he comments that he is sure that industry federations may have interesting views. It could be a way of finding a balance.

Filip Geerts says that CECEIMO strongly believes in voluntary agreements. However, as long as the VA guideline boundaries set by the Commission remain in force, it is impossible to make it happen, i.e., to reach the 80% market coverage minimum is impossible, at least for the machine tools industry sector.

Michael Bennett asks if it would be possible, or indeed better, to consider a fleet-based ecodesign regulation, if that were possible in the future?

Filip Geerts says the question will be taken into consideration.

Paul Waide responds to Edouard Toulouse, and agrees the consultancy team can add something about what to consider in the event of a voluntary agreement, or at least come up with possible options.

Edouard Toulouse says that an industry association might come up with a proposal for a points system that could include weighting. It might be impossible to find experts to come up with a better set of weighting. The question is, how do we then respond to this? Do we just say: ok, or do we come up with a set of elements to be checked? Therefore, it would be very useful to give an idea to the industry group preparing a voluntary agreement on what to think about, and how it will be evaluated, e.g., share of ordinal versus nominal, quality of technical data etc, given by the industry association (and its members).

Edouard Toulouse has a second question. Are there are not dozens of products in the ecodesign workplan that could or would need a points system? Can't the consultants come up with a 'could' list of candidates for a points system approach? Or could you do the opposite and say which products don't need a points system approach?

Michael Bennett answers that the above questions seem to be very much product-specific, and therefore it will be unfair to talk about product groups that haven't even begun their passage through the typical Ecodesign process.

Paul Waide answers the question of Edouard Toulouse and says there are plenty of products with a lot of complexity. Hence, this work can certainly be used to apply a more systematic approach on considering the issues of complex products.

Mike Rimmer wants to pick up on what Edouard Toulouse said. You might find that there are certain products within each of the ecodesign measures that will fit themselves to a points-based approach. If you bring this work forward at the study level at Stage 1 or 0 in the MEErP process, then you might have washing machines or other products that could be treated via a points system, and other products going down the traditional energy efficiency route.

Tom Lock asks for clarification. Is this an open question that we're not sure yet where the panel and weighting will go into the process?

Paul Waide responds that there are different panel needs. As a general thing, yes some thinking on where that could occur will be helpful and we will write something up. Suggestions are welcome.

Tom Lock asks to use a graphical diagram for the next generation of the report. This would help to simplify presenting the stages and processes involved.

Bram Soenen says that before starting with the MEErP there is the Ecodesign Working Plan. You may start with the Working Plan as a point of departure from which to identify for which product groups a points system might be relevant.

10. Next steps

The deadline for comments is set for the end of March.

The consultants and the Commission will examine the feedback received, and reiterate some of the work for Task 3 and Task 4.

There is a task 5 in this study. On the wish-list of Task 5, Michael Bennett has noted from previous considerations, and taking into account feedback from today's discussions the following possible options, from which only one will be possible (feasibility to be discussed with consultants if feasible):

- Test real machine tools to examine the feasibility of the points system approach postulated;
- Do analyses regarding the effects of duty cycles on the overall considerations regarding machine tools;
- Data storage devices: check the technical weightings on the percentages used in Table 6 (page 31, DSDs Task 4 case study);
- Further work on uncertainty and error propagation;
- Cross-referencing the Task 3 report with the Task 2 report findings (through part of the current work).

Michael Bennett asks if anyone has additional thoughts for Task 5 (bearing in mind the 2- to 3- person weeks of budget and timeline available)?

No further suggestions.

11. AOB

Michael Bennett thanks all the stakeholders for their valuable contributions.

The meeting closes at 17.30.

Annex 2: Technical assistance study on "points system" methods – Stakeholder comments on Task 3 Method Development report

Organization: Daikin Europe	Name: Durca Pathmanathan, Takahiro Oki, Els Baert	Date: 28/03/2017

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3	1	7	Scope	In the introduction it is written: "a "points-system" methodology that could be applied to the development of Ecodesign requirements for **complex products and/ or product systems.**" - The link between product system and complex system is unclear. - Is the intention that the methodology can be applied for a complex product without its impact on a wider system and also a non complex product with its impact on a wider system?		The intention is that the methodology can be applied for a complex product with or without addressing its impact on a wider system. Indeed the methodology is explicitly designed to enable wider system issues to be treated and this is demonstrated in the data storage case study shown in Task 4.
3	3.2	10	Definition of a complex product	The definition on page 10 is different from the glossary on page 4. Page 4: "No single definition (see section 3.2) but may have any of the following characteristics: - does not provide a standard	Align to avoid overlap or similarities and make clear what is different.	These are not intended to be the same. The text on pages 10-11 reports the feedback we received from multiple stakeholders regarding how they viewed a complex product to be. Not surprisingly, that feedback reflected a range of views and differences in proposed definitions. In the glossary

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				configuration / functional unit - may have multiple functions - may be modular - is often a customised product, adapted to a specific application - can be finally installed at the user's site, *and/or* - can have different performance levels dependent on the operating conditions at the user's site - can have functional parameters that are inherently difficult to measure " Page 10: "A complex product: - does not provide a standard configuration / functional unit - can have multiple functions, - can be modular, - is often a customised product, adapted to a specific application, - can be finally installed at the user's site, *and/or* - can have different performance levels dependent on the operating conditions at the user's site - can have functional parameters that are inherently difficult to measure. "		we make an attempt to synthesise these views by expressing characteristics that complex products may have but even there we take pains not to attempt to make a precise definition of what a complex product is; not least, because this would be a subjective view rather than a formally agreed position among EU Ecodesign stakeholders. Furthermore, in our view it is likely to be unhelpful to make a formal definition as aspects of complexity may arise in the future that were not hitherto considered. Nonetheless, the Task 3 methodology presents a process that passes users through a set of logical steps that help determine whether a points system may be helpful or not and thus having a precise definition of what is a complex product is not a precursor to using this process.

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3	3.2	10	Definition of a complex product	- We should avoid using and/or - Does the product have to correspond to one of the first 5 points and the 2 last points, or to one of the 7 points mentioned ? This is not clear. This point system approach was launched in order to better address the product groups that cannot be dealt with the conventional Ecodesign method. From this point of view, we should take a restrictive approach to "Complex article", and avoid an open scope.	Replace "and/or" by "and".	See previous remark – the study team were not asked to and did not have a mandate to develop a formal definition of a complex product. Rather , in our view, this is a question of judgement by which regulators have the liberty to consider the potential set of characteristics listed in this study and any others that they may consider relevant when deciding whether a product may be sufficiently "complex" as to require the use of the types of methodologies set forward in this study.
3	3.2	10	Definition of a complex product	The terms should be more restrictive.	- "does not provide" by "is not capable to" - "can" or "may have multiple functions" by "shall have multiple functions" - "can" or "may be modular" by "shall be modular"	See above.
3	3.2	10	Definition of a complex product	The 1st and 4th points of the definition seem to be similar. - " does not provide a standard configuration / functional unit And - "is often a customised product, adapted to a specific application If a product does not provide a standard configuration, it's a customized product. A standard configuration should be clarified. If it is for example for testing performance, then it		See above – these are a set of quotes of stakeholders views on what a complex product is – this is why there is some overlap between them.

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				should be explained accordingly.		
3	3.2	10	Definition of a complex product	Clarify the meaning of a "functional unit".		A functional unit is the quantified performance of a product system for use as a reference unit in a life cycle assessment study
3	3.2	10	Definition of a complex product	In general, the boundaries of the definition are not clear. It seems that we are looking at the same time on the: - the aim of the product (functionalities); - the components of the product; during the: - designing of the product; - the installation of the product; - use phase.	Improve the boundaries of the product.	The methodology is deliberately constructed to allow the product boundary conditions which regulators deem to be relevant to be taken into consideration. This echoes the approach of not trying to derive an unmandated, specific and contenstible definition of a complex product but to allow any given regulatory rulemaking process to make the determination of what the product boundaries should be.
3	3.2	10	Difference between a complex product and an extended product	The boundary between a "Complex product" and an "Extended product" is not clear. Some points of the definition of a complex product are the same than for the extended product. It seems to overlap. - "can have multiple functions" and "Product / system with more than one function (machine tools, washer driers) - "can have different performance levels	Have one definition that combine the definition of a complex product and an extended product. The points that are used for an extended product may be included in the definition of the complex product.	Explanation of what is meant by a simple product, and extended product and a product system is provided in the latest MEErP study. This study simply references the MEErP for these distinctions.

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				dependent on the operating conditions at the user's site " and "The performance is too dependent on the duty cycle (pumps, motors)"		
3	5	18/19	Step 1 Difference between stages and phases	There is a confusion on the use of the term of "stages" and "phases". On the Task 4, both of them are used.	A clarification needs to added. For example: " A product life cycle stage might contain several phases."	This is a subtle point. We are careful in when we use the wording of "stage" or "phase" when referring to the product lifecycle. Essentially, lifecycle stages are referred to when considering the stages of product lifecycle impacts whereas lifecycle phases are referred to when considering the intended intervention points through prospective implementing measures. The phases to be considered are those specified in Table 2 and are the phases in a product's lifecycle where prospective implementing measures could be intended to apply.
3	5	19	Step 2 Scope	This step 2 will assess the product scope boundaries. If these boundaries change, these may affect also then the outcome in Task 5 of MEERP. Clarification is needed how this change will be handled. As we are using the results of the MEErP for the environmental impact, it's not appropriate to change the scope boundaries as long as the results will be changed (namely the important life cycle stages and environmental impacts).	This step should be before the step 1 as we need the scope boundaries for the LCA on the MEErP.	We tend to agree with this comment and have therefore revised the Step order accordingly in the final version.

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3	5	19	Step 2	Further clarification on the three criteria for assessing product boundaries (a), (b), and (c) is needed. For example, are the products which get 2 yes not complex article? (e.g. HVACR products)	Establish clearer and more objective criteria.	We use the definitions applied in the MEErP study for these elements.
3	5	20	Step 3 Isolation of impact criteria	For the step 3, chosen impact criteria will be treated independently. However, it is better to also check if there is interference between chosen criteria. Some of the impacts may be more or less correlated and certain may even be antagonistic.		We agree that there can be interaction and interdependency among impact criteria and make this point in section 4.1; however, the clear view of stakeholders at the first stakeholder meeting was that this study and associated methodology should not attempt to compare across impact parameters and therefore we have avoided doing so. In principle, though it would be possible to devise a points system approach which did this and allowed trade-offs to be made (see section 4.1).
3	5	20	Step 3 Scope	If the scope from Step 2 is different from the MEErp one, how can we be sure that the impacts that we take are still relevant?		Product scope boundaries are considered in Step 2 while Step 3 is concerned with the selection of the environmental impact criteria. As this work would be done in conjunction with the MEErP Task analyses efforts would be needed to ensure the scope is the same.
3	5	20	Step 3 Impacts	Economic impact is not taken into account. When the environmental impact budget is determined, there should also be the economic impact budget. For example, some design options may lead to improvements in terms	Economic impact should be included on the step 3.	Although the Ecodesign regulation requires minimum value thresholds for energy performance to be set at least life cycle cost levels, which in turn requires economic analysis to be conducted, this topic was intentionally not meant to be addressed in the current study's terms of reference. The study team

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				of energy performance but it could also be difficult to carry this out from an economical point. it is not favorable to implement this huge methodology and then find out that it's unfeasible economically.		note, however, that there is nothing in the proposed Task 3 methodology that prevents such analysis from being done in line with the MEErP methodology and informing decisions on the level of minimum energy performance thresholds to be applied.
3	5	21	Step 4	It is not clear if the phases that we are determining on the Step 4 are from the important lifecycle stages of Step 1 or from the entire lifecycle stages of the product.		The phases to be considered are those specified in Table 2. These are phases in a product's lifecycle where prospective implementing measures could be intended to apply.
3	5	21	Step 4	Table 2 states "Potential Ecodesign measure", but whether or not it has a potential for eco-design measure comes at the end of preparatory study.	Replace "Potential Ecodesign measure" with "Environmental Impact"	Final recommendations regarding implementing measures come at the end of a preparatory study but that doesn't prevent potential implementing measures being listed earlier in the process.
3	5	21	Step 4	Table 2 says there is some potential for eco-design measure for installation phase. It should be considered that eco-design regulation is about the placing on the market of products, and manufacturers cannot fully control how products are installed. Enforceability should be kept in mind when setting requirements. From this point of view, potential for eco-design measure on the installation phase is limited while its environmental impact is not negligible.	Replace "Potential Ecodesign measure" with "Environmental Impact"	While noting the comment we consider the current wording to reflect our understanding of the potential legal applicability of Ecodesign implementing measures.

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3	5	21/ 22	Step 5	These questions have to be more objective. The words as : "appropriate", "relative importance", "acceptable", "compromise" are very subjective. Everyone can interpret its own way.	Objectivise the questions.	We consider the wording used to be appropriate because it is not intended to create a prescriptive formula (indeed the stakeholders warned the study team away from such an approach) but rather to create a framework under which these considerations can be assessed. There will inevitably be a degree of judgement involved and this cannot be precluded.
3	5	21/ 22	Step 5	This step confirms if the points system is used or not. Unfortunately, at this stage we don't know if the product is complex or not.	In the methodology, for example "Step 0", there might be another point which will indicate why the product is complex.	This step is one of the steps to determine whether a points system is likely to be merited or not, but not the only one. If the answer to any of the questions posed is yes then it may be appropropiate to use a points approach.
3	5	22/ 23	Step 6	For the step iii) a), If the answer is yes, the steps i) or ii) may be applied. Does it mean that a module with more than 2 functions will be split in order to have 1 module with 1 function?	Please clarify.	It means that for modules with dual or multiple functions which behave independently of each other that one would apply the tests in steps i) or ii) to decide how to proceed.
3	5	25	Step 7	The report says "In principle, application-specific Ecodesign requirements could be imposed on products ….In addition, product specifiers and installers could be required to follow generic Ecodesign requirements that would govern the process they are required to follow in specifying and installing products for any given application". We highly doubt the enforceability of such requirements on process of	Investigate the potential of this proposal. It seems difficult to enforce, and may interfere with local requirements or other EU requirements already in force.	Inevitably such issues would have to be assessed were this approach to be considered for application within any implementing measure (including a voluntary agreement). However, it should be noted that installation level energy performance requirements are already set and enforced in EU Member States in the case of building codes, for example, but also for energy labelling of space heating systems, thus precedents

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				installation.		have been set.
3	5	25	Step 8 Reference case	Can the definition of a reference case be clarified? For the "Machine Tools", the reference case is not the product which is representative of the average energy performance on the market at a given time but it's the case for the "Data Center".		The two case studies addressed in Task 4 show that there is a need for flexibility in how reference cases are set and the methodology in Task 3 allows for this. For example, for the data storage case study the existance of a product database of energy performance when performing specific functions allowed a reference case to be defined based on this data (where the reference case model is a product that has an average impact parameter performance for any given functionality within the database); while for the machine tools case study no such database was available. In the latter case the only potentially viable approach required the performance of each product to be compared to themselves but positioned on a scale where at one end no impact parameter performance enhancing technologies are used (the reference case) and at the other where all impact parameter performance enhancing technologies are used (the BAT). This approach enabled normalisation against function without requiring functional units to be defined, which is near impossible for highly heterogeneous products. This was the only approach that could address the heterogeneity within the product group and manage the difficulty in

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						defining a common and objective function.
3	5	25	Step 8 Impact budget	At this step, the impact budget is assessed separately for each environmental impact. Comparison with the economic impact is not taken into account.	The economic impact has to be integrated on the assessment of budget by design option.	Although the Ecodesign regulation requires minimum value thresholds for energy performance to be set at least life cycle cost levels, which in turn requires economic analysis to be conducted,this topic was intentionally not to be addressed in the current study's terms of reference. The study team note, however, that there is nothing in the proposed Task 3 methodology that prevents such analysis from being done in line with the MEErP methodology and informing decisions on the level of minimum energy performance thresholds to be applied.
3	5	29/30	Step 8 Uncertainty	The uncertainty methodoly is not refered to any existing methodology. The reasoning of this calculation is not clear. For example, the addition of ordnal and cardinal values might also be used instead of the difference.	Clarify each step of the calculation and the reference of this methodology.	The principle of discounting values within a points-ssytem as a function of their degree of uncertainty is set out and an illustration of one potential system for treating estimated uncertainty is set forward; however, it is not the intention of this study to define and defend a definitive approach to this topic. Further work, beyond the scope of the current limited-study, would be required to derive such a system.

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3	6	33	Process	It's mentioned that Consultation Forum will be hold and then the results will be presented to a final Stakeholder group.	Given the different roles in each group it seems better to first discuss in Stakeholder meetings before discussions at consultation forum.	This aspect has been amended in the revised methodology following all stakeholder feedback.

Organization:	Name:	Date:
ECOS-EEB-Coolproducts	**Chloé Fayole**	**20/03/2017**

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3		21		The proposed assessment method on page 21 to determine whether a points system approach is merited is a bit confusing, as it includes a circular argument: it says that a points system method is considered appropriate if in question c) it is answered that a points system method is considered appropriate.	Rewrite this paragraph to make the three questions more straightforward and robust.	We have studied the text (repeated at the bottom of this cell) and do not think it presents a circular argument because it makes the potential applicability of a points-system conditional on: i) the viability of applying a conventional rigorous performance assessment method ii) that a points-based approach could offer an acceptable compromise which allows implementing measures to be set which encourage progress in a positive direction. This clearly still requires judgements to be made during the regulatory process as to whether or not these conditions are met. "c) it is too complex to apply a rigorous performance assessment method in practice, but a points-based approach (which awards points depending on the ecodesign

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						features used) could provide an acceptable compromise that allows requirements to be set that encourage progress in a positive direction without being overly constraining?"
3		26-30		The proposed methodology is only illustrated by examples relating to energy consumption in the use phase (which is the simplest possible case). What happens with more complex topics, e.g. resource efficiency? How to attribute points to sometimes nominal data (for instance, the presence of recycled plastics in a product, which is not easily quantifiable in terms of direct impact)?	Add another illustration case relating to a more complex impact criteria like resource efficiency. Show how the methodology would apply in such a case, especially if there is nominal data.	It is not necessarily the case that the energy in use phase is the simplest case but it is generally the most important for energy-related products and hence is the subject of greatest focus. The Task 3 methodological steps, including the budgeted impacts approach graded by comparison with a reference case, could in principle be applied to any environmental impact parameter where it is possible to measure (i.e. via cardinal data) or rank (i.e. via ordinal data) the product's impact on the parameter in question. All that is required is that in place of the energy performance the other impact parameter performance is assessed. It becomes more problematic when the impact parameter cannot be objectively assessed by measurement or by putting in a ranking. In this case though there is unlikely to be much agreement on how to proceed whatever the method put forward.
3		30		The way to treat ordinal data in points systems is a critical issue, and should be looked at in-depth. Yet, the proposed method to award points to ordinal data on top of page 30 is very simple and normative, and it is not clear where it comes	Beef up the analysis of how ordinal data may/should be treated. Include a comparison with other methodologies, and a discussion on the pros and cons of different approaches.	The treatment of ordinal data is discussed and indeed for the first time in Ecodesign literature the distinction between cardinal, ordinal and nominal data is made plain and considered. The Task 2 report provides illustrations of various

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				from. It is not referenced. Has it been invented from scratch? How are ordinal parameters treated in other existing points system methodologies? The material from Task 2 could be used here for reference, comparison and discussion.		points systems and how they have managed this topic. The principle of discounting values based on their degree of uncertainty is set out and an illustration of one potential system for treating estimated uncertainty is set forward but it is not the intention of the work to define and defend a definitive approach to this topic. Further work beyond the scope of the current, limited, study would be required to derive such a system.
3		30		The methodology does not specify how nominal data will be treated. Yet, in the machine tool case study, some nominal parameters are considered and weighting proposed. As this is an essential aspect, it would be relevant to already address it in task 3 at a general level. What are the most robust ways of dealing with nominal data and checklist type of data? How is it done in other points system methodologies? What are the pros and cons? What are rules and safeguards to include nominal points in an overall point score? With what weighting? What do you mean by 'pairwise Analytical Hierarchy Process (AHP)' and 'a panel or expert decision-making group' (in the machine tool case study)? How would this panel be formed? Who would be the experts? What are the minimal conditions for making acceptable and accurate decisions?	Clarify the methodology and various approaches for treating nominal data in your method. Clarify what you mean by panel or expert groups, and how these 'groups' should take decisions. What to do if they don't reach a consensus? Etc.	This comment may imply a slight misunderstanding of how the Task 4 machine tool case study treats nominal data. In that case study nominal data is used to establish whether a product is providing appropriate usage guidance and also whether a design process has been followed. The checklist approach advocated determines the degree to which this is the case or not and the points awarded for each item on the checklist are in line with an agreed procedure, which would presumeably be established by an expert panel based on sifting the available evidence. The weighting to be given to these checklist aspects compared to the more cardinal/ordinal aspects are also imagined to be determined by a designated panel. This approach is fully consistent with the Task 3 methodology and also reflects the state of the art applied in other points systems methods as reported in Task 2. The AHP is described in the Task 2 report and is essentially

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						a specific method used to reach maximum consensus on the importance of pair-wise value judgements between a set of stakeholders. The decision on who should comprise the expert panel is something that the Commission and mandated stakeholders would need to agree. Additional text has been added to further discuss this topic.
3		30		The issue of uncertainty in a points system method is acknowledged, but is not analysed and discussed at an aggregated level. It is said on page 29 that a blend of cardinal and ordinal data is possible, but what is the impact on the uncertainty of the overall score? If there is a large number of uncertain ordinal parameters, the representativeness and accuracy of the end-score may very well become an issue. How can the overall uncertainty be assessed? What level of overall uncertainty should be considered acceptable? How is this treated in existing points system methodologies?	Develop the issue of overall uncertainty of a point system methodology. Explain how the overall uncertainty is calculated and give some examples. Discuss what level of overall uncertainty is acceptable (which may have an impact on the maximum number of parameters and ordinal data a method should have).	The principle behind the discounting values based on their degree of uncertainty is set out and an illustration of one potential system for treating estimated uncertainty is set forward but it is not the intention of the work in this study to define and defend a definitive approach to this topic. Further work beyond the scope of the current, limited, study would be required to derive such a system.
		31		Step 10 - Support to regulatory decision making: The methodology and recommendations seem to have been developed only considering a hard regulation context (mandatory regulation). What about Voluntary Agreements (VAs) (which are likely to be proposed by industry for complex product groups)? If industry proposes a VA including a points system method, what would be the relevant criteria to assess it?	Clarify the methodology steps in the case of a VA proposed by industry. Develop recommendations and criteria to assess points system approaches proposed in VAs.	The text in the final version has been amended to better reflect that the method is intended to be applicable to any kind of implementing measure – whether a regulation or a voluntary agreement; however, it is beyond the scope of the study's terms of reference to clarify the methodological steps in the case of a VA proposed by industry and to develop recommendations and

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				What are the minimal conditions for acceptability that you would propose? What level of flexibility can be tolerated compared to the methodology you have developed for hard regulation?		criteria to assess points system approaches proposed in VAs. In our view this would require an additional piece of work dedicated to this topic.

Organization:	Name:	Date:
EPEE	**Not indicated**	**March 2017**

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			Clearer definitions and better differentiation between concepts	Task 3 provides a definition of "complex products", which is too broad and vague and does not allow to clearly and easily determine if a product is complex or not. This clarification is critical as it will determine whether the points system method is applicable. In addition, the boundaries between "complex products", "extended products" and "product systems" are also too vague and do not allow for a clear distinction between these different concepts.		Actually Task 3 avoids making any such definition but rather reports what stakeholders said they considered to be a complex product and then presents a synthesis of the aspects that may be characteristics of a complex product. The study team were not asked to and did not have a mandate to develop a formal definition of a complex product. Rather, in our view, this is a question of judgement by which regulators have the liberty to consider the potential set of characteristics listed in this study and any others that they may consider relevant when deciding whether a product may be sufficiently "complex" as to require the use of the types of methodologies set forward in this study. Having said this the study does set out a methodology that allows screening of whether a product is sufficiently complex for it to potentially be eligible for application of a points-systems approach, but this is not the same

						as presenting a definition of a complex product.
			Striking the right balance between improved environmental performance and cost-effectiveness	Ecodesign measures aim at improving the environmental performance of products, while ensuring their cost-effectiveness and affordability for consumers. The proposed methodology allocates points to some design options on the sole basis of their environmental benefits. We consider that economic aspects of each design option should be weighted in the methodology so that the environmental performance of products is improved without entailing significant negative impact on consumers, in particular as regards the affordability of products.		Although the Ecodesign regulation requires minimum value thresholds for energy performance to be set at least life cycle cost levels, which in turn requires economic analysis to be conducted,this topic was intentionally not to be addressed in the current study's terms of reference. The study team note, however, that there is nothing in the proposed Task 3 methodology that prevents such analysis from being done in line with the MEErP methodology and informing decisions on the level of minimum energy performance thresholds to be applied.
			Ensuring that requirements derived from the methodology are enforceable	EPEE considers that it is critical to ensure that Market Surveillance Authorities are able to carry out compliance assessments in order to avoid distortions of the market and to protect consumers. It is therefore essential to make sure that potential requirements based on a point systems methodology are enforceable. The proposed methodology would require procedural checks (e.g. how the product design) rather than checks on the outputs via testing (e.g. minimum energy performance requirements, noise requirements, etc.). These procedural checks imply an in-depth technical knowledge to assess the application of design		Viability of market surveillance is certainly an important isuse when considering the viability of any prospective Ecodesign implementing measure (including voluntary agreements). The methodology set out in Task 3 does not inherently require procedural checks and depending on the product type in question may follow any of the accepted Ecodesign Directive's compliance pathways. By way of illustration, in the Task 4 data storage case study the proposed methodology applies the Task 3 methodology in a manner that is entirely verifiable by testing of the product. By contrast the Task 4 machine tools methodology necessitated an

				option on products that MSAs do not necessarily have.		approach that is partly based on procedural checks and hence this comment is more pertinent in that case.

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