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 From : Wai Chung Lam Annex(es): - Presentation 2nd stakeholder meeting
 - Draft reports Task 1 – Task 5
 (see documents on www.erp4cables.net)
 To : Cesar Santos; ENTR Lot 8 Stakeholders
 Copy : Paul Van Tichelen, Dominic Ectors, Marcel Stevens, Arnoud Lust

Minutes of 2nd stakeholder meeting for the preparatory study Lot 8 on Ecodesign for Power Cables

BREY Building, Brussels, June 3, 2014

Present

European Commission

DG Enterprise

Name

Cesar Santos

abbr.

CS

Project Team

VITO

Paul Van Tichelen

PVT

VITO

Dominic Ectors

DE

VITO

Marcel Stevens

MS

VITO

Wai Chung Lam

WL

Stakeholders

Schneider Electric

Jacques Peronnet

JP

IGNES

Emmanuel Petit

EP

Deutsche Energie-Agentur GmbH

Rafael Noster

RN

EDF

Maud Franchet

MF

BAM (German Federal Institute for Materials Research and Testing)

Daniel Hinchliffe

DH

AIE (European association of electrical contractors)

Evelyne Schellekens

ES

CENELEC TC20

Helmut Myland

HM

Nexans / Europacable

Sophie Barbeau

SB

Prysmian / Europacable

Stefano Luciano

SL

ECOS (European Environmental Citizens' Organisation for Standardisation)

Stamatis Sivitos

SS

European Aluminium Association AISBL

Bernard Gilmont

BG (only in the morning)

OVAM (Public Waste Agency of Flanders)

Marc Leemans

ML

ECD (Engineering Consulting and Design)

Franco Bua

FB

ECI (European Copper Institute)

Fernando Nuno

FN

Objective of the meeting

Stakeholder consultation in the framework of a study with regard to Ecodesign of Power Cables (Lot 8) accomplished under the authority of DG Enterprise of the European Commission (EC), under specific contract No 185/PP/ENT/IMA/12/1110333-Lot 8, within the multiple framework service contract No FC ENTR/M29/PP/FC Lot 2, preparatory studies and related technical assistance on specific product groups.

The main objective was to discuss the technical aspects related to the study (Task 1-5 reports) and to present the next steps of the analysis.

Agenda

- Welcome
- Short presentation of participants
- Short overview MEErP
- Presentation of draft Task reports 1-5, including: updates, questions & answers, discussion
- Break & lunch
- Data gaps identified to complete the study
- Discussion on approach to fill data gaps and the potential launch of a new enquiry
- Any other business
- Planning and Closure

Minutes

- **Short presentation of participants (all)**

After all participants presented themselves, CS shared some observations to inform the discussions. It is time to think what kind of potential requirements like Ecodesign, labelling, or if any, we want to propose for this product group. We have the benefit of last week's adoption of the transformer regulation. CS has followed the transformer discussion closely and what he observed is that at some point in time the stakeholders were able to agree on representative load factors of transformers; which enabled the discussion on what we mean with energy efficiency and to calculate efficiency levels that are economically justified. This is better for regulation and the standard.

With this in mind, CS sees that the main difficulty in this preparatory study of this product group is to crack the similar discussion on what we mean as the energy efficiency of a cable, and what representative usage patterns or load factors are of indoor electrical installations. The way we eventually are going to characterise the energy efficiency will always benefit some but also penalise others. CS role in this discussion is therefore from a regulatory perspective. Before we even are considering mandatory requirements, CS wants to see an acceptance and agreement among the stakeholders of what representative load factors are for different types of installation. CS has not seen that yet. With hindsight of the discussion on transformers, CS sees that stakeholder's agreement is the key element to make progress towards characterising energy efficiency factors for power cables.

- **Short overview MEErP (PVT)**

See PowerPoint presentation of the meeting and general information available on the project website: www.erp4cables.net

abbr.	Comment/answer
CS	As a reminder: in almost all of the Ecodesign regulations that are adopted so far, the observed principle was that the requirements are independent of the use of the device. This has enormous implications for cables. The way that the Ecodesign methodology works is that abstractions are made from the reality, called base cases, which are representatives of

	models that are used in the market and with to do economic modelling. In order to come up with requirements that are economically justified. But in the end, the requirements are independent of the final intended use of the product, whether we are talking about transformers, fridges or motors. For cables in CS opinion, this constitutes an enormous difficulty because of the wide heterogeneity in how cables are used and the different load factors.
PVT	Agrees with CS and thinks that this was in any other products. For example lighting products, if an incandescent lamp is not used, it might have a lower impact compared to a LED or CFL lamp that is used. Therefore, assumptions on averages are necessary and we have made the assumption that products are sold for being used. Upon that, averages on the use of a product are connected, and upon that again connections with regulation. For cables the dilemma exist of discontinuous use and cables for e.g. emergency lines. But one big difference for cables compared to other products is that cable products are straight forward to model in use and the choices in type of cables are limited to size of the cable.
MF	Q: Does this mean that the model will be the same for cables of a power plant, lighting cables and other cables?
PVT	A: Yes, but we will discuss whether we want to have more base cases. However, the first principal is to keep it as simple as possible. And the second, if we think we can make it more complex for our measures, we will incorporate it. The first exercise we now have done is with 5 base cases. But already based on our first outcome [see Task 1 report], we think that we need more base cases. The question how much more base cases do we need.

Regarding the planning, it is important that there is an agreement on the methods and approaches, and how we can collect more data. We also saw that we had imprecise calculations, so every suggestion on realistic timing to provide us with data for the later tasks, the scenarios, is important. The current outcomes maybe are not the outcomes you want, but please let us also know where we can collect the data and what we need to do for the data. Data collection is important, so any suggestion is welcome.

▪ **Presentation of draft Task reports 1-5, including: updates, questions & answers, discussion (PVT/MS/DE)**

The objective of this part of the presentation was to see which input and method is used; what the Ecoreport tool is; what the crucial factors are, and what the impact of those factors is, for example the load factors and stock have big impacts. The load factors must not be overestimated, because the losses in cables will then be bigger than the known electricity production in Europe could justify. We must be realistic in over- or understating factors, which is an exercise we already have done. At the end of Task 5, crosschecks of the data sources of Task 2 were done which lead to the finding that the losses in the cable were too unrealistic high. For which several reasons can be given, one of which is the load factor; but also the stock, the formulated base cases, and the imprecision of the model. This problem must be solved in the given method. Main uncertainty is on the load factors.

Task 1 (PVT)

We consider the cable as a system with a circuit breaker. We look at the installation at system level. Therefore, the circuit breaker will not be looked into for improving the efficiency of it; we only take into account that there is one. However, if one will say that there is improvement potential of the circuit breaker, another study needs to be done.

See PowerPoint presentation of the meeting and draft Task 1 report available on the project website: www.erp4cables.net

abbr.	Comment/answer
JP	Q regarding the scope: is only AC current in the scope, and not DC current?
PVT	A: We will come back on it later in Task 4. We have seen that DC current comes more in important with photovoltaic panels and people want to use it more at their home. It is important to know what is brought on the future market. Maybe in an extreme case there will be only a DC circuit in homes.
JP	Q: But is DC included in the scope or not? As it is not improved.
PVT	A: I need to think about, because it is after the meter and it is for the power distribution. There is one line in Task 4, where it is mentioned as Best Not yet Available Technology.
JP	Q: Ok, but is it in your scope or not?
PVT	A: It is in the scope for the improvement potential, not for the Business As Usual. We have too few evidence that there is DC, apart from some photovoltaic panels on some houses. So it is in the scope of Task 4. But if you have information on what is ongoing on standardisation of DC, it is welcome. We have seen that the US is working on standardisation of DC in houses.
JP	We don't say that it is ... we could have some circuit breakers in DC. Is DC considered or not considered in the scope? But I don't need the answer right now.
PVT	We are thinking about it, so if you have a vision on that it is welcome.
JP	You have to clarify it.
PVT	So DC is in our radar, but it is very difficult to treat it the same as AC. The onset was the improvement in AC. Of course, we hear from people that DC is better.
JP	If you are considering load factors, I do not see the difference between AC and DC.
PVT	No, but for the safety, people say you can go to a higher voltage level and the current is lower in the same cable
JP	Exactly, we say 1,000 V AC or 1.5 kV for DC. That is the equivalent, what is the limit of low voltage volt.
PVT	We will further document it in the next revision of Task 4.

abbr.	Comment/answer
SB	Q: You say that residential is excluded from Task 3 to 6?
PVT	A: Yes, we excluded them for looking for improvement, but not from the scope of the study. Because we think, we cannot find improvement in there. Of course, we need to look backwards in Task 7 if there is no collateral damage in that sector. But our conclusion was that improvement in energy efficiency was not to be looked in that application area. Of course, in Task 2 we have looked at the market data with the residential sector, and in Task 7 when formulating the policy measure we will look if the measure will also affect the cable of this application.
SB	Q: But the directive is focused on the product and the cables are used independent of their application. So how could you excluded residential sector, put the directive on the product and expect that it will have an impact on the residential market?
CS	A: It is complicated and my thinking goes the same way like yours. But, in many cases we are talking about products that can be regulated and the directive is the framework of that. I think if we end up regulating anything, it will be the installation itself. I think what Paul is trying to say is that the improvement potential in the residential sector is almost negligible. And that we eventually put them in the regulation of the installation in the professional and commercial sector.
PVT	Complementary, maybe we will also look if changes are needed in the product information.
CS	Then we are faced with a different challenge, because the directive talks about putting into service or placing on the market and this concept becomes instable when we talk about indoor electric installations. So we need to tend to be obliged by the law before we consider

	any regulation.
PVT	Yes, because the installer makes the installation and that is important. So the question is, is this a tailor made product? We will come to these issues at the end. We first need to see where the improvement potential is and it is important to understand what the method is and what is in- or outside our scope in relation to the tasks.
JP	Another question about the scope: If you speak about electric installation, in this case you do not only consider the cross section of the cable but also the length is a key issue. Once again you cannot play on the product itself.
PVT	Yes, we look at the circuit as described in our reports. As we will present in a later stadium, the improvement potential as such is not for the manufacturer to invent a new cable. It is about the installation with other cables or better cables adapted to the circuit.
JP	I do not want to spend much more time on the scope, but maybe the first thing to improve the scope for the next meeting and add clarification.
PVT	We will also put circuit in our scope.
JP	Add exactly what you are focussing on, what you want to with the scope, and be very clear: is it just on the product, on the cable, or on the installation and on which kind of installation? Please clarify it for the next time.
PVT	<p>Of course, but Task 1 will always remain conform Task 1 of the method, but what will be changed and what we already have seen now that we are running in iterative circles in our team, and that there are several currents to be defined. You have the circuit current and the maximum current that the cable can withstand, so in that sense we will define more precisely the types of currents according to the standards. The thing we mainly need to and where we can improve in Task 1 is to define four or five parameters for currents.</p> <p>What also needs to be clarified further is that the installation codes use lower currents compared to the maximum that is allowed for certain cables by the standards. So if you install a circuit for a certain application according to the standard, the current is always lower than the theoretic maximum current in the cable. But this will not change the calculations much that we have done. In Task 5 we have a table with three or four currents according to different standards and we need to select one. For us the most important current is the rated circuit current.</p>
SB	You say it has no impact on the calculations, but if you consider I_{max} , the maximum current carrying capacity, if you change it by the rated current of the circuit, which is lower, than this will change the capacity.
PVT	Yes, of course, we have taken that already into account. But what is more complex is the maximum operational temperature and the percentage of influence by the temperature of the cable, as the situation calculated in the standards is to withstand 90° which is not representative for the real load loss. In real conditions, it is lower and we need to discuss how we can deal with that. But, we take that into account and it is the point of our discussion and the input we collect. So, it is certainly in our scope to take that into account and we are looking into which resistance we should use in our calculations. We think that the one on the maximum temperature is to extreme. At the end we need to be very clear and a sensitivity analysis will be done.
JP	[Remark on slide no. 17:] For me, these parameters, current capacity, are linked with safety and not with energy efficiency.
PVT	No, it is functionality for the end user who wants to connect the load. But our vision is that we should be in function for the end user, why does he wants a cable in his house, and that is to transport energy. Of course, we could have to transport the power. But with the voltage fixed, we can discuss that too. But, we thought that the main thing on the current carrying

	<p>capacity is the power factor, which is also included in our study. The current carrying capacity was selected because it is functionality for the end user. Cables are not installed for decorations or amusement. So secondary performance parameters are of course important for the product and its functional specifications; e.g. the cross sectional area, the bending area, DC resistance.</p> <p>We will differentiate base cases according to their use, as we know that the load factor is important. So we need to discriminate that. Therefore, we need the parameters.</p>
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Please provide us the following information for the sake of completeness:

[Slide no. 19] Measurement & test standards: In the standards, there are no specific targets and no typical load factors.

[Slide no. 20] Legislation: what we can further complete is an overview of the national wiring codes, to illustrate the country specific differences.

[Slide no. 21+22] Can be further defined and if there new insulation materials that are not in the standards yet.

abbr.	Comment/answer
SS	<p>Before moving on to Task 2, may I comment on this conclusion [slide no. 23]. Please take into account that I am stepping in for a colleague and that I was not at the previous meeting. I have quickly gone through the documents and of course, I do not want to add more complexity. I was just looking at the other two criteria apart from the improvement potential for the cables applied in the residential sector and I see that they are a significant amount of the sales and the final energy demand. However, the improvement potential is up to 1 TWh, which is the unspoken threshold of this community if you want.</p> <p>I was just wondering since this was the first screening, is there a possibility that that improvement potential would be higher than that? And if so, we as ECOS would welcome that if that improvement potential is further looked into and taken into account in the other Tasks 3-6.</p>
PVT	<p>Yes, I think it could be. The improvement potential is compared to the current installation codes, so someone who installs everything according to the current regulation will have this low improvement potential. In the existing stock, there might however be an improvement potential if it is renovated according the current regulation. At the end of Task 7, we can mention in a paragraph that during the study it was told that in certain countries there are houses in a poor condition with cables that need renovation. We were also told that in certain countries, I thought in France and Belgium, when a house is going to be sold, installations needs to be recertified and old uncompliant installations are forced for renovation. But as told, such a measure is out our scope of this study and different from a situation is where cables are sold and installed.</p>
BG	<p>We had the same problem with windows, that when you enter that segment it eventually will fall under the energy certificate EPBD regulation for renovation. And there the optimization happens for the whole product.</p> <p>We did the same recommendation.</p>
SS	<p>And for new cables that will be put on the market for new buildings? Do you think if the improvement potential will be beyond the 1 TWh?</p>
PVT	<p>No, maybe in certain installation codes per country there are curtain heavy loads that need requirements. So we can compare installation codes of residential homes, maybe there is something small that is overlooked, but we are not aware of that.</p>
SS	<p>Any information you have of what you are stating now can be very useful in the further course, also for in the future. As this is useful information for the Commission to decide whether they proceed or not in any legislative measures. Nevertheless, any of such</p>

	information should be included in the report, as it is also useful for the stakeholders.
PVT	Therefore, we need the installation codes for Task 1 and in Task 7 we will come back on that by including your comment that there is also improvement potential identified in the existing residential buildings. But of course, this is not the purpose of the complex calculations that we will discuss now. If we will take renovations also on board, this will make the calculations more complex.
CS	Can I just clarify on this non-written rule of thumb of 1 or 2 TWh. It applies on the annual energy savings estimate by 2020 and so let us not confuse the improvement potential with the energy savings estimate. Then you are jumping a bridge, assuming that the regulations would capture all the improvement potential and would translate it into savings. Below 1 or 2 TWh per year of energy savings estimate, the Commission normally does not propose regulation.
PVT	But for 'installations' countries are free to decide as it is different from the EU 'product' regulation.
FN	The problem of savings potential in the residential sector is not between doing something properly and something else properly. The old circuits are not fit for today's consumption patterns. So there might be some improvement potential, but this is a different discussion. It is not by improving the design of the electrical installation but just by updating it to the current standards. This is another topic but if this needs to be added to the picture, further analyses are probably needed. Upgrading the old circuits might make sense for safety and energy savings reasons. But I understand this is a different study and not in the scope of this one. For the residential sector, I think the starting point and findings we are looking for are different.
CS	I think this is a valued comment and there you are really pointing into the direction of the EPBD and retrofitting. The implementation of the EPBD is at national level. At the end of the day, people need standards to know how to make an installation energy efficient. So which every way we look at it, we need a standard to make cables more energy efficient.
PVT	Yes, I agree, at product level we could only request for information related to losses. Currently users/installers are familiar with the Cross-Sectional Area (CSA) as product information but have few awareness and/or information on their losses.

Closing comment on Task 1: It should be clear that the scope of each task is defined by the task and that we look to whole circuit not at the cable alone.

Task 2 (PVT)

The economic data collected is data that the Commission has or what is available in Eurostat and completed with other sources. We look at stock data and sales data. The sales data is important because it tells something about product regulation and what is put on the market. It is important to know that we have found that there is a long lifetime in the residential sector, as the renovation rate is very low. In the industry and service sector, it is much higher. Because of the long lifetime of the product, the sales and stock data needs to be precise for the modelling. Something the stakeholders could improve is the sales data.

See PowerPoint presentation of the meeting and draft Task 2 report available on the project website: www.erp4cables.net

abbr.	Comment/answer
FN	Q: Why is stock data relevant?
PVT	A: It is relevant for the lifetime of the product and at the end in order to make crosschecks. For example, we need to know how many cables are sold that are unloaded due to backup reasons and that the losses are mainly in a few percentages of cables installed. We need to

	know: what is the stock and what is the loading, because everything is interrelated.
FN	At some point, I would say that the sales figures are more reliable input data than any guess on what is installed. The Prodcom data should be reliable and this guess.
PVT	<p>The two reliable sources are indeed the sales data, if we have it for this product group from the manufacturers, and the energy consumption. These are for use the most important parameters to which we check and fit. This means if the stock is larger but can be fitted to the lifetime of the product and the length of the circuit, then we know the loading. The most reliable figures normally are the energy use and the sales data. Of course, certain stock data should be reliable as well. But at the end, in Task 5 we will do crosschecks in order to see which data is reliable and what can be improved.</p> <p>In this task, we collect data even if it is not reliable. What we have learnt in such studies is that it never fits, there are always inconsistencies, but in the end, we will have realistic data that more or less fits. The view is realistic, but we can discuss about 10-20% more loading, or stock, or a longer lifetime, so there is a certain playing field. But we should start with something realistic from which we can improve further. Some data sources cannot be modified easily, such as the sales data, so we need them more precise.</p>
SB	Q: Is it expected to take into account the impact of the Ecodesign directive and energy consumption that will go into power cables? The purpose is to reduce the energy consumption in Europe with 20%. Meaning the energy that is going through cables should be calculated also. Is this something that will also be taken into account? If you reduce the energy consumption until end of reach, this means the energy that goes into the core, into the cable, will decrease also...?
PVT	Yes and no, I think. In our model we can take certain things into account [see upcoming tasks], but the impact are fixed values in the MEerP methodology. So, a TWh electricity used is a static value. If we go 100% green energy, then our discussion for energy efficiency ends.
DE	There are projections of energy use in Europe in the next 10, 20 years. And these figures are fixed, are already set, with these efficiency measures taken into account. So also, there will be more electrification coming in the next years: you will have electric cars, more heat pumps. So we use the figures that are in the methodology.
SB	Yes, but the base case that you take into account, when you count the installation... in specific the installation... reduce the energy consumption.
PVT	... but for a base case it is not important. When you install a circuit you know the load, when a machine is installed in a factory, that machine will not change and become more efficient during its lifetime.
SB	Yes, but during the production the machine can be changed.
PVT	Yes, maybe there will come more efficient machines on the market in a few years, but on the other hand the circuit will be used more for other things. For the generic figures, we consider this. But for the load factor it is static, we will not say that the loading of a circuit in a factory will become more efficiently and that that is 20%. But we can simulate that in a sensitivity analysis, we can sweep the load factor and see what the impact is. So we take it in a certain way into account, but not everywhere and not for a base case where a circuit is put on the market. We think when a new circuit is put on the market, you will do these assumptions.
FN	I hear about refurbishments are the main driver for the collection of potential regulation. For refurbishments, normally also the loads are refurbished. So in this case, whether they are more efficient, than ok, they will consume less, than the cables should be also calculated for such loads. In principal, this should not create any mismatch.
PVT	Yes, I think so too. What we have found is that the most important efficiency gain is probably in the load.
CS	Can I just say a thing on the previous comment [of SB]; I see your point. But, we also know

	that the average number of appliances per household is increasing all the time. So yes, when replacing the refrigerator is maybe more efficient and it consumes less, but there is also a percentage of people that keeps the old refrigerator in the basement.
SB	Yes, for residential, but I think for the industry sector it is different.
CS	That is something difficult to model.
SB	Yes, I just wanted to know if it is taken into account or not.
PVT	Of course it exist, probably there are companies that are an example for everything. In the industry there are such diverse applications that it is possible that after a while a new process is invented.
SB	I am not even thinking of changing the processes, but only changing the motors to ones that are more efficient.
PVT	<p>If we decrease the application, losses will always become lower, but they are interactive. So sometimes, we discuss interactive effects. For example if an application is reduced by half and becomes twice as efficient. You will have half the losses in your application, but in cable, it is by square.</p> <p>So, there are always interactive elements that make it more complex and our calculations are simplifications of the reality. In addition, we should see which elements we take into account and which elements not, and how we are considering it. Normally this will be done in the sensitivity analysis at the end of the study with arguments if it is meaningful to lower load factors and for what reasons. It is useful to keep this discussion in mind, as persons who draw up energy efficiency plans in companies are not only focused on losses in the cable but also on the loads. In conclusion, we should not replace the one with the other.</p> <p>[Note: In the end, having a good assumption on load factors is crucial; which is an element of Task 3.]</p>

[Slide no. 30+31] Please provide us with more accurate data on the distribution of power cables, in order for us to update it with more realistic data.

abbr.	Comment/answer
FN	[Q on slide no. 32:] Is the stock calculated based on sales, divided by renovation projects? Or on the working plan [as mentioned in table 2-21 on the slide]?
DE	A: Yes, from the working plan, it should be from the calculated stock.
PVT	There are several ways to calculate that. You can have sales and stock data. We discriminate renovation sales sometimes from replacement sales for renovation of existing floor area and new sales for new built floor area. We should see how important it really is from which data we calculate it.

abbr.	Comment/answer
FN	I have read in the report that the prices are from web catalogues, I think that those prices do not reflect the reality of prices of installed cables and that they need to be representative of the reality.
PVT	We have made inquiries at installers and the prices are different per country. But yes, this can be improved. We have calculated the discount prices here based on our inquiries on what an installer can negotiate as discount.
FN	I think this is quiet sensitive. Taking prices from internet is not solid enough in my opinion.
PVT	We will see. In certain applications, yes, it is true, and in certain, it is not true. At the end, every 10% will count. We know the bottom prices of the copper below which the cables will not be sold, and we have the prices on internet. The reality is somewhere in between, so this can be improved. We also need to mention that the prices are for the 2010 scenarios. We should always correct the prices and the prices are very volatile. That is also a problem.

	For easy working, we have used internet prices including a 10% discount rate for the installer. This is said to us that that was the margin. It can be more which differs per country to country. But, this can be improved and is easy to retrofit afterwards. Of course, this is important for the improvement options at the end. We need a playing field between the bottom and maximum prices that we can use in the sensitivity analysis. This can be improved with input from the installers, but often this is a sensitive subject for an installer. For example, the catalogue prices in Belgium are much higher than what an installer pays.
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[Slide no. 34] What needs to be conformed is whether a thicker cable is more difficult and costs more needs more time/costs for installation or whether that the length is more decisive. This can be improved and can be an inquiry to the installers.

Task 3 (PVT)

This task is on the use of the cable, like user context, loss parameters, End of Life. Important to mention is how we approach this as a product: the product in this study is the cable as a strict product scope. The circuit including the circuit breaker is the extended product scope. The electrical installation is seen as the system, and the buildings and the loads are the system environment. We use these terminologies in this context.

See PowerPoint presentation of the meeting and draft Task 3 report available on the project website: www.erp4cables.net

abbr.	Comment/answer
HM	[Q on slide no. 44:] Are the load form factors (Kf) of 1.11 and 1.06 possible for the industry sector?
PVT	A: For the form factor yes. A sign wave load is 1.4 for example and a continuous, flat load is 1. The average value is the same as the RMS value. From this table you can see that we have assumed quiet flat loads, as opposed to lighting circuits as lights are only switch on a few hours a day resulting into high factors. In dedicated circuits, we also assume that there not much used in the industry.
FB	Q: I am not sure if I am understanding the Kf.
PVT	A: It is a calculation of the load profile. And the average value of the load profile is not enough, there are more losses and that is reflected in the RMS value, root mean square value, that counts for the losses in the cable. The losses are the highest when the currents are the highest in the cable and that is reflected here. Of course, there are different ways to assess that, but the easiest method is with the equivalent times of peak load. In the study, an example is included of a calculation with two loads. You need two parameters, the average loads is not enough for loss. [See Task 3 report for more details on the calculation.]

abbr.	Comment/answer
SB	[Q on slide no. 48:] What you assume for the product lifetime for the industry and services sector sectors, how is it calculated?
DE	A: That is calculated from the renovation rate. In the industry and in the services sector, we have used 7%, as can be seen on slide no. 32, which is about 14 years.
SB	Is this in all the industry?
DE	It is in all the industry.
SB	I think this is impossible to have 14 years for product lifetime in the services and industry sectors and a product lifetime of 70 years for the total sector. I think there are some issues somewhere in the calculations.
HM	I am really interested to see a cable that is installed 169 years.
PVT	Yes, but we needs the average values of course.

HM	The figures that are presented now show it is stupid to calculate with averages...?
DE	It is based on the figures [on slide no. 32] that are based on a renovation study.
SB	Can you provide your calculation based on renovation rate? Renovation is one thing, but there is also demolition. Sometimes a building is never renovated, just demolished.
DE	If you have these figures [slide no. 32] and you have 7% for example. This is the replacement. Than you have 1 on top of 7%, which means 14 years.
SB	I think that 7% is incorrect.
DE	Yes, therefore we need better figures. These figures come from a study by Ecofys and were supplied by different sectors. So, if you have better figures, we will have better lifetime figures.
PVT	Yes, because from this, the sales and stock are calculated and that is important. If we have a big stock of cables and there is little energy going through the cables, the load factor will go down and the losses, the efficiency of the cables will increase. So everything is interrelated. Therefore, it is important to see the outcomes of Task 5, to see that everything is linked with each other and that we do crosschecks. [Note: The values that we are looking for are averages that produce correct total EU impact as discussed in Task 5.]
CS	So I think, what the group is trying to tell you, is that you need to do something about these data [on slide no. 48]. If the average is 170 years and if you assume a standard distribution, than this means that, some values are 200 or 300 years, which is impossible. So you need to revise the data or assumptions.
PVT	Yes, it is mainly for the residential.
SB	But you cannot say that the figures on the residential sector are the only ones that are not correct, if the figures are not correct for the residential you cannot expect that it is correct for the services and industry sectors. I know that the key is getting reliable data; but we are for sure that the value for residential is unreliable.
DE	Even if we take a renovation rate of 1% [instead of 0.59%], than we come to a product lifetime of 100 years.
CS	Maybe you need a more sophisticated approach, rather than taking a percentage and turning it upside down. You need a more sophisticated approach.
BG	Yes, not just assuming a renovation of 1 percent is 100 years...
PVT	What people say to us: 1% renovation rate is overly optimistic however that 1% is equivalent to 100 years product lifetime?
CS	Are you not confusing the renovation of a building with the renovation of an electrical installation? Because the two are not the same.
PVT	Yes, that is true. Recently in some countries there are checks of the electrical installation and the codes are changes, so the people have to reinstall the electrical installation before any other renovation work.
CS	I think you need a plausibility check, and what the group is telling you is that the figures [on slide no. 48] do not make sense. You need to try harder.
SB	I do not have a reference, but the renovation rate on a French label on the lifetime of a product considers a lifetime of 20 to 40 years.
MF	Yes, it is 40 years in France.
BG	The only good reference we have for renovation is Renovate Europe.
SB	However, renovation does not mean product life.
PVT	Yes, there is also a service life, because a building can also be empty for a while for example before it is rented.
CS	The installers, can they help in the discussion of what is the average lifetime of an electrical installation?
ES	Well, it is very depending on if it is residential and renovation rates in certain countries, on

	average we would say 50 to 60 years. To come back on what we said before, we should renovate more on the existing stock. In the industry, I do not know exactly, I would say it is renovated much quicker.
PVT	In Task 5 we will also see what is the impact of this. Because if the figures say that there is sold a lot and that the product life is long, it will mean that there is also a big installed stock. So that meaning that there is much copper installed in buildings. With the figures we have now, it more and less fits. Of course, if we increase the lifetime, we maybe have to say that the length of the circuit is much longer. Which can be the case, if the cables are not directly connected and on average longer. Another possibility is that the loading per cable is much lower. We think it is a mix, we think that the cables on average have a lower load, that there are more cables, and that the circuits are longer. It is difficult to have compliant data.
CS	We cannot move on like this, we need a strategy to improve those values. What are you planning to do?
PVT	The only thing we can do is having inquiries, mainly to installers and engineering companies.
ES	It is not easy to have the data. If you look at the installation companies, in the companies self, they do not do those statistics. The statistics on how much meters installed and so simple do not exist. Maybe the larger installation companies can have an idea of how much they have installed a year more or less, but the majority, 95% of companies are small companies.
PVT	And the precise sales data, and assumptions on the lifetime should lead to statistical data that we have on renovation rates. But low renovation rates, means a higher stock. The sales data should improve that with the manufacturers. The lifetime we can check with statistics from Euroconstruct or other sources on the renovation rate.
FN	Q: What is the relationship between sales and loading?
PVT	A: With the length of the cable, with the typical circuit... our proposal will be to have more base cases: highly loaded, medium loaded, and lowly loaded. The improvement potential will of course be in de highly loaded cable. The lowly loaded cables we will not deal with them. Probably, we will have the biggest effect by addressing the cables that are highly loaded in reality, and we need to find a way to select them and to improve them. Potentially, there are many cables installed that have a low loading, which is the reality and not something wrong.
CS	I think Franco wants to intervene.
FB	Yes, you were asking for a strategy on this specific issue. I think the strategy is that an electrical line will be changed if the process itself is changed. With this, you need to look at how much the process is changed. This strategy may give a direction; I do not have an exact solution. As the theoretic lifetime of a cable is very long, the process has a shorter lifetime. If I have to give a figure, in any case, I would say that the rough average is 15 to 30 years depending on the application.
PVT	We now use 15 years, what is in our feeling rather the minimum. But if we would use 30 years, we would have more cables in stock, resulting in a problem with the loading of the cables; or we should change the length? A possible new base case can be with many cables and low loads?

Task 4 (PVT)

Task 4 is also on analysing the product. Important elements of Task 4 for Task 5 are the Bill of Materials (BOM) and the volume. With the BOM the production impact is modelled and with the volume the transport impact.

What we want to improve is the installed cable in the circuit; we do not want to change the manufacturing of the cable. Maybe the only possible thing that needs improvement during the manufacturing is the insulation material and the recycling of it, only if the outcome says that there

are many lowly loaded cables and that the insulation materials manufacturing plays a role; this could be. But in first instance, we say the issue is not to improve the resistance.

In the standard, the cross sectional area is a nominal CSA, but what we have heard is that in the reality, there is a guarantee on the maximum resistance. Nominal means it can be higher or lower but the standard guarantees the nominal, maximum resistance, which means that the quality of a cable is guaranteed by the standard. Therefore, we say that there is no improvement potential on the nominal cables, because the nominal cables have to follow this maximum resistance.

See PowerPoint presentation of the meeting and draft Task 4 report available on the project website: www.erp4cables.net

abbr.	Comment/answer
HM	Q: If you call it maximum resistance, it is the resistance maximum for 1 km or whatever length of cable at 20 degrees C?
PVT	A: Yes
HM	Q: It is not the maximum resistance at highest temperature.
PVT	A: yes
HM	You have to be very sure on the maximum resistance, because we are talking about loaded cables and the maximum value in the standard; it is different.
PVT	Indeed. We also have a problem with which resistance we are going to use for the real loaded cables, because it is lower than the maximum and it is higher if looking at the higher temperatures. In certain standards, you need to look at the maximum temperatures, and the maximum resistance on the maximum temperatures. So maybe there is an improvement potential, if some alloys have another temperature influence, but we are not aware of the improvement if the materials are changed to another materials that has a higher resistance at a higher temperature.
HM	There are tables inside the standards to calculate this.
PVT	Superconductivity or different insulation materials could be an option on product level, but the main improvement potential is the CSA or two cables in parallel, with refereeing to the standards.

abbr.	Comment/answer
JP	[Q on slide no. 52:] On what is based, that DC power will have an impact on the energy efficiency? What is the database on that? I think it is not true.
PVT	Q: Do you think this is not true?
JP	A: No, when comparing the data of the data we have it is true for 230 V AC more or less, but when increasing the voltage in AC you will get exactly the same results. So in my opinion you need to remove this "DC power distribution in commercial buildings", because it is not really true. At least you need to have any data on it.
PVT	But on the same safety level. Of course if you go to a lower voltage, you increase the current and then you increase the ...
JP	Yes, because the main efficiency is to increase the voltage. But this independent of the fight of AC versus DC.
PVT	No, but on AC, as what is said to us or what you can find on the website of the Emerge Alliance, in the AC standards the installation and the safety level is determined by the peak. This means in 230 VACrms has 380 Vpeak that defines safety and 380 VDCrms has 380 VDCpeak. As a result, 230 VACrms can carry less power compared to 380 VDCrms for the same safety level and current loading of the cable; therefore, DC is more efficient in this case. Also in DC you do not have a poor power factor that could increase losses?.
JP	Yes, they claim, I agree on that they are some claims. If you write this, you need to prove this. Today, DC power distribution and AC power distribution are exactly the same if you use

	exactly the same voltage. When you compare, you cannot compare eggs with chickens. There are very different.
PVT	It is Best Not yet Available technology. We will see what we are going to do. I also think it is not really an option that we will say that Europe should switch to DC, so this is very hypothetical. It is only for the completeness and of course, we should add a line with the assumption that voltage level is increased.
JP	Yes, but you can do it in AC as well, it is not linked to DC. For me DC is not a new technology. It is really something that is already available. You can use it in some applications. Like photo voltaic, it is due to the source and then it is DC current that needs to be transferred into AC. This is quite a critical edge to get more efficiency. The way to become more efficient is really the voltage.
PVT	It is also important not to have a loophole at the end of the legislation. Imagine that we write legislation for new AC installations and that in a few years the market all wants to go to DC, resulting in a loophole?
JP	Yes, that is why I had the question on the scope; but I do not agree with that DC power is linked with more efficiency than AC power. It is not true.
PVT	But we make reference, so we refer to the responsible organisation, and maybe we will have success with that. It is important for us that we should also be viewing future developments in order to avoid loopholes.
JP	I do not have a problem with AC or DC, for me it is more or less the same. But with the fact that it is linked with energy efficiency.
PVT	Yes, we can take note of that, and of course, it is a fact that if the voltage is not increased there is no difference.
JP	Exactly.
PVT	So it is more a discussion on voltage levels that can be used in cables and in safety.
JP	Yes and not the type of current.
FB	I support this, because DC is linked with energy efficiency with reference to the conversion DC – AC. We are integrating sources with DC, we have DC appliances, and we are distributing to AC. So each DC – AC and AC – DC conversion is something that obviously leads to losses.
JP	In any case, there is also conversion in DC using the same voltage.
FB	Basically, the efficiency is linked to avoiding conversion losses, rather than distribution.
PVT	And that can be a bigger driver, so the driver is maybe more in the convertor and in the load. Maybe we should mention this in Task 2 as a trend. This might be the reason that people go to DC? If we are only writing AC legislation now and proposing AC legislation at the end, we might miss new products. This is more our point of view to mention DC, rather than to include or excluded it in our scope. We should be aware of this.
JP	But I do not agree with your opinion that people are going from AC to DC, there are no applications in DC only PV-panels.
PVT	There are batteries. Inverters in principal also start from DC bus internally for motor drives.
JP	Yes, but is not really linked with energy efficiency, but with the technology.
PVT	So, maybe we can put this also at the load level and say that there is also a driver at the loads for going to DC and it fits more with the loads efficiency?
JP	Just, do not speak about efficiency. It is not linked with the efficiency.
FB	If there is no DC equipment... at the end the end-use is the driver.

MS explains the Bill of Materials (BOM). We are not sure on everything that we have included in the BOM, so if the stakeholders have more information on the materials, please provide us with the information.

abbr.	Comment/answer
SB	Q: Are additives, plasticisers and things like this not considered? They might not have impact on the energy efficiency, but as the Ecodesign Directive also mentions resource efficiency. It has to be noted that it is possible that some specific materials that are used in the cable manufacturing will have more impact on other Eco-indicators than copper, PE or PVC. You can request for data, but we cannot provide you this confidential information of manufactures. But it should be mentioned or taken into account in some way that some products or raw materials might have more impact than the three basic materials of cables.
SS	Just one point from my side: we would of course welcome such information to be included in the report. With respect to the confidentiality of the data, I understand that fully. But based on my experience from other preparatory studies typically the one on compressors, which also applies to the sales data in Task 2, the manufactures undertook from what I have understood quite an extensive exercise in which collected data were anonymised and collected by a third party, and by that means they were given to the study consortium. So, it is of course a sensitive and critical exercise, but I think in the interest of this preparatory study that it is welcome if it is in such sense possible for the parties involved to look into it and I would advise the study consortium to contact the person responsible for the compressors preparatory study. It took them quite a long time, so they have the knowhow in how that exercise was done and I think it benefitted the study quite a bit.
PVT	That is possible. In the data collection, we can sign a confidentiality agreement and we can aggregate the data as we already have indicated in our first inquiry. The data that manufacturers send us after the first inquiry we have made it anonymous. So we can do the same as for the BOM, if this is crucial.

DE explains the section on the distribution of product: the transport and packaging [slides no. 55+56]. The transport costs in the Ecoreport tool is a default value, which cannot be modified. This has a big, unrealistic influence if the unit used for the base case is very small.

abbr.	Comment/answer
MF	Q: Does the transport take into account whether a cable is heavier?
DE	A: It will be in the volume. The volume is the only parameter that is an input for the Ecoreport tool. There is no parameter for the weight of the packaged product.
PVT	The distance is also not a parameter for the transport. Only the volume is the only parameter. In the background report of the Ecoreport tool there will be more explanation on this, which we do not know by heart.
DE	It is also the tool that has to be used.
CS	The Ecoreport tool is a simplified life cycle assessment (LCA) tool to calculate the environmental footprint of a product. In the discussions we had during the development of this tool, we concluded that it is too complicated to model where all the raw materials are sourced from, the mines and the distance it travels for the production. To have a meaningful modelling, we would have had to throw millions of euros into to the modelling. So we agreed to the consultants that we give up trying to calculate this extended environmental footprint of products, so we simply do not make any assumptions where the raw materials are sourced from, whether they are from Chili, Asia, or Africa.
MF	Q: Is the transport the same, whether it arrives by truck, train, or boat?
HM	If there is no distance, it is invalid.
SB	Q: What are the assumptions used in the distribution phase of the cable? Is there a distribution or transportation module in the software?
DE	A: There is a transportation bases on volume.
SB	Q: Is it also used for the transportation of raw materials?

PVT	A: No, but this is in the BOM. The modelling of the production phase is purely based on the BOM of the product what Marcel had explained are the only input parameters of the Ecoreport tool.
SB	Q: The processing is not taken into account?
PVT	A: Yes, but it is not a full life cycle analysis as manufacturers do by themselves. This is very simplified.
SB	Q: Is it mandatory to use this tool?
CS	A: No, it is not.
SB	Ok, we can go into more detail on the calculation, but the raw materials are not always the most impacting input of the manufacturing. Depending on the environmental impact...
PVT	But I think that the MEERp parameters assume processing, meaning that the Ecoreport tool parameters are for 1 kg processed copper. So, there are already extrapolated or averaged for several processing steps.
SB	Processed copper can underestimate the environmental impact of cables and can lead to drawing false conclusions on potential impacts of cables. I want to point out that it could be very low values compared to the reality of life cycle impacts of the production phase.
PVT	Primarily in the working plan, products are identified that the use phase dominates, meaning that the precise modelling of other steps is of lower importance. That is also the rationale why it is simplified. Because, the initial idea of the commission was to go for energy efficiency with taken into account Ecodesign. Of course, if it turns out that the main impact comes from the production, than our method is too simple and everything sits in the small details. It needs to be clear that the MEERp is not suitable for that. We can mention this, but what you can do in parallel with your LCA tools is to check whether the outcomes are valid.
SB	We can check if your conclusions are in line with the conclusions we get based on a detailed LCA.
CS	That is very nice. To come back on your question whether it is mandatory or not, the methodology has no legal backing, so it is a means to an end to facilitate to work with consultants. So far, to the best of my knowledge, all the Ecodesign requirements are related to the use phase of products, and it would surprise me if this were the first product where we propose requirements that are related to the production. But, if you think that this tool is not sophisticated enough than you can double check with you own LCA tools.
SB	Of course, if you look at energy consumption, the indicator during the use phase may be probably the most important one. If you look at resource depletion, manufacturing plays the impacts for 90%. If you look at ozone depletion, than transportation is the most impacting one. So, in the end it depends on what you want to prevent in terms of environmental impacts.
CS	I think what we have in mind with this policy tool is the use phase of a product... some of you are looking at me horrified...
SL	What about the kind of environmental impact that we want to minimise? Just to be in consumption or also other kind of environmental impacts...
CS	I am not saying that is not important, but the Ecodesign Directive might not be the best tool to regulate those impacts.
SB	What I must say is that especially for cables, the resource depletion of copper is a big topic and contradicts if we at the end recommend that we need a higher cross section. Maybe we want to have a higher impact on resource efficiency instead of increasing the energy efficiency.
CS	I knew you would make this point eventually. The assumption is that the environmental footprint of the extra copper is negligible compared to the energy savings, but this needs to be documented.
SB	I can already tell you that it is not negligible.

CS	If it were not negligible, we would not regulate it. As I say, our working assumption is that this will be negligible and that has to be documented.
	Q: Is this already addressed somewhere in the preparatory study?
CS	A: Yes, we have had these discussions for electric motors and transformers. In general, more efficient means larger, because of the law of physics. In those two cases, it is already documented that the energy savings more than compensates the extra environmental impact of using more copper or aluminium in the products. We have had this discussion already before for other products.
SB	Q: How do you rank energy versus resource?
CS	A: There are several ways for doing it. You translate it to a common currency.
SS	As an environmental NGO, of course we want to see all the environmental aspects being tackled and therefore the study should address as much as possible. We recognise that the methodology might have some the limitations. The Directive is currently being revised and we see this is an opportunity moment to tackle other resource efficiency aspects. But I think for the purposes of this study, any other information you have would be very useful, we have to work within the system that we have at our disposal and try to see how we can make the best use of this.
CS	If there were zero burden shifting than there would not be environmental regulations.
SB	I know, I agree. Actually, because together with some mandate on standardisation to include resource efficiency into the Ecodesign Directive so... On what we can implement, what we do in one year, six months.
CS	Let me be clear on that mandate, we can already propose Ecodesign requirements on material physics for any products. The problem is with the non-attribute properties, that is why we have the issue to mandate, but this is in the directive since 2005.
PVT	Of course, this can be a recommendation or a finding, but this affects the production not necessarily the outcome. The improvement potential could be in the production process. The production of copper is quite standardised and maybe not a good example. It could be more in the type of insulation material to use based on the environmental impact of the insulation material. But this is a different area of the initial starting point of this study, where we have identified energy saving potential in our working plan and the method is suited for this. We assume that the copper used in cables is not very different from the copper used in transformers and motor. That is why it is already in the model as it already has been discussed. I would expect that it will be more in the insulation of the cables and the paper [of OVAM] on this is distributed.
ML	Yes, it is discussed in the paper, not in detail, but there are some recommendations.
FN	To finish the point on materials, I think that if none of the materials is identified as critical raw materials then it is a complete list. Or any other legislative framework, I do not think that we need to care about whether resources are going to be depleted or not.
SB	I have a report of JRC on the negotiation of resource efficiency measurements and copper is clearly identified as a key metal for the resource efficiency topic. So I think it is maybe not defined as critical in the EU definition in terms of economy and supply, but I think it needs to be considered as critical in terms of resource efficiency.

DE goes further explaining the section on improvement, design options and recommendations in Task 4 [slide no. 57].

abbr.	Comment/answer
JP	Q: Why is the topology scenario not the scope of this study?
DE	A: Then it has to be modelled. Then you have to know how the typologies of these

	installations are on average, where the load is located and where the distributions boards are.
PVT	It is in the scope of Task 6, the improvement options.
JP	So, it is not in the scope of Task 4 but in Task 6. So, the header of the last column is not correct in this case.
DE	This is a mandatory section of Task 4. This is the official heading.
PVT	Maybe we should reformat the heading in saying that is in Task 6 and that it is not a considered improvement option in this study, but we will keep this in mind for Task 6 as a policy?

- **Continuation after the lunch break of the presentation of draft Task reports 1-5, including: updates, questions & answers, discussion (PVT/MS/DE)**

Task 5 (DE)

Task 5 is about the environmental and economic impact assessment on the 5 different base cases with the use of the Ecoreport tool as provided by the MEERP methodology.

See PowerPoint presentation of the meeting and draft Task 5 report available on the project website: www.erp4cables.net

abbr.	Comment/answer
HM	[Q on slide no. 66:] If you have two or more cables, in parallel do you use the simplified method to add the current simply or do you know that there is an influence and that there is a reduction?
MS	A: Yes, we have considered the reduction.
SB	[Q on slide no. 68:] You said you cannot publish the responses of the survey of the installers?
MS	A: It is an average length.
SB	Q: So you cannot publish the responses and the resources of the installers. How much feedback did you get?
DE	A: Not that many, I think 10 responses.

DE explains the Ecoreport tool spreadsheets that are filled in for the base cases. The materials that can be selected are limited in the tool, for example for the insulation material high density polyethylene (HDPE) is selected.

abbr.	Comment/answer
HM	[Q on the Ecoreport tool:] Earlier you mentioned recycled materials for the insulation; there is one option for recycled materials.
PVT	A: Yes, we did not choose that one, because it is more for packaging materials. And HDPE is not the exact material that is used. So we use the materials that are as close as possible to the BOM.
SB	Q: Would it not be better to choose LDPE or LLDPE instead of HDPE?
MS	A: I thought it XLPE between medium and high density PE; or is it wrong?
SL	A: It is a low density, but not very low density.
SB	Rather use LDPE than HDPE. In addition, with regard to PVC, you should not use recycled PVC. It is difficult to use recycled PVC, because the manufacturer does not know what for substances are added to the PVC.
PVT	Yes, we can change this.
HM	May I propose something for the insulation material for electrical safety reasons; I have never heard that insulation materials are recycled materials.
PVT	But, the recycling process is very sophisticated, at the end if you buy PE it is from raw oil, so

	it is refined. You do not want to know what it originates from. It is the outcome of a factory and they recycle in the factory.
HM	It is a process to produce PE. It is different from recycling existing PVC to PVC again. It is really different. They recycle but it is not recycling in a way as it is used for building materials. It is not only just putting in a mill and extruding it.
SB	Recycled PVC is probably leaching PVC and you do not want to use that with copper. In cables, we use soft PVC that is compound based.
PVT	Ok, we will change this. What is interesting is if you have more data in order to compare the differences.
SB	Yes, we will make the remark.

abbr.	Comment/answer
SL	[Q on the results sheet of the Ecoreport tool, without changing the materials as discussed in the above:] We see that there are more environmental impacts than energy depletion. So in fact, the energy consumption is not the only impact that is taken into consideration when making the calculation.
PVT	A: Clearly, global warming potential is -17 emissions to air and you can see that the impact during the use phase is 139; nonetheless, during the production phase the impact is 29. So the production is not negligible. If the loading in the cable is zero, the impact during the use phase is also zero and the impact of the production will still be 29. Therefore, the loading of the cable plays an important role. Already we can see here that for the lighting circuit, base case 1, the production phase is not completely negligible with taken into account 50 years lifetime and a loading of 20% of the cable. On average, lights are used 2.000 hours of the 8.000 hours. If you would say that, the lights are used for fewer hours, than the production phase will be more dominant.
SL	But apart from the numbers, there is a political choice to not only considering the energy depletion impacts, but also other impacts. As said before, regarding the copper depletion, it is difficult to consider copper depletion as well as energy depletion. But here you have considered multiple impacts. When you have to make decisions, what are going to consider more, the energy depletion, the ...?
PVT	Well it is not to us, we only produce these results. The Commission makes the decision. We are now collecting the evidence and these are the outcomes, but clearly, heavy metals are in this case more related to the production of copper and the use of coal to produce electricity is less important. For the incandescent lamp, it is different; the mercury in the lamp was negligible compared to the use of electricity.
SL	But the political conclusion is that the energy depletion is not considered only but also other impacts.
CS	The directive says that any environmental impacts associated to a product that is significant can be regulated. This is the first difficulty, because the significance is not defined objectively anywhere. It is subjected to political interpretation. So, this is the tool that is used to spot which impacts are significant. Then there is a long process to fulfil a number of criteria before the requirements are on the table. There has to be an improvement potential, affordability for consumers, and a competitiveness of the industry. So, we need to demonstrate that the requirements are cost effective, meaning that the industry can reasonable can accommodate it without making huge investments. Once this is all out of the way, then the Commission makes a regulatory proposal and then the member states decide. And in that process, a lot of things are abandoned. So to give you an idea, from that huge potential that the directive foresees, the reality is that there are 25 Ecodesign regulations, 25 products. Energy efficiency was regulated in all of them, water consumption in 2 cases, durability in 2 cases, and NOx and SOx in one case that is not even adopted yet.

	So you see from what is theoretically possible compared to the reality, many things are abandoned right away. So at some point in time, we need to go from the technical considerations to the economic justification and ultimately to the political level which are the member states. In the end, you need to understand that if a proposed regulation is against the interest of a certain member state; they will manoeuvre to try to change it. In the end, we end up with minimum, common dominators where all member states and the industry can live with it.
SL	So, as a first step, we will consider all the impacts.
CS	Yes, but there is no system to arbitrate, there is no hierarchy of the environmental impacts.
SL	But you need to have a hierarchy.
CS	And who is the referee? This has been discussed many times. Whichever way around, we have decided there will be always someone that is not happy. The question on the hierarchy has been avoided for years.
SL	I understand the problem, but I mean that you have to consider it in any case, even if you do not consider the copper depletion, you will have 4 or 5 impacts. You have to have the hierarchy to discriminate the different impacts at the end.
CS	The study team does not have the mandate to prescribe the hierarchy of environmental impacts. It is a problem that is very difficult to deal with. It is similar to the discussion in weighting the environmental impacts. The colleagues in the environment are trying this for years to combine all environmental impacts as a single indicator and to decide how to weigh the different impacts. That is why it does not exist.
SL	Ok, so there is no way to weigh the copper depletion.

abbr.	Comment/answer
SB	Q: In the calculation, is the use of a European electricity mix used?
PVT	A: Yes, this is in the MEERP.
SB	Q: Are you going to do a sensitivity analysis depending on the electricity mix?
PVT	A: No, that is a fixed value to avoid a debate on how it should be mixed. We do not do a sensitivity analysis on the fixed parameters of the model.
SB	I was not considering a different mix of electricity types, but a country mix.
CS	We had the same discussion during the Ecodesign study for the transformers. Obviously, we are calculating the life cycle costs and the least life cycle costs; and the price of electricity is one factor in the formula. By definition, if the price of electricity in Germany doubles compared to the prices of France, the least life cycle costs will not be the same. So then, we are comparing apples with oranges. In the end, we need one piece of legislation and the fairest way to do it is a pondered EU average; as far as I know, that comes from Eurostat. You have to understand that we cannot have 28 pieces of legislation.
SB	Apart from product category, is it something that has been evaluated, how much does it affect the conclusions? Roughly to estimate if it has a high impact or not.
CS	The impact will be proportional to the spread in the prices of electricity across member states.
SB	Or the type of electricity?
CS	That discussion is loaded, because member states are very sensitive about their energy mixes. So there is not much that we can do.
PVT	But with the prices we do sensitivity analyses, but not on the mix and the impact of the mix. As the price is an input parameter of the study. The environmental impact of the electricity is based on a mix of Europe. The grid is interconnected so the assumption is that it is a single value for Europe.
CS	As a consolation, Norway has 99% hydroelectric energy and they are penalised by this energy factor conversion. Additionally, the Ecodesign regulations are applicable in Norway,

	but they do not have saying in this discussion because they are not a member state. So, they have the worst of both worlds: they are penalised by the energy mix and they do not have any saying in the discussions.
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abbr.	Comment/answer
FN	[Q on slide no. 84:] The base case definitions.... You have a million installations?
PVT	A: That is also low; however this means that if increase stock there will be even more losses. We have also data on how many buildings there are in Europe. Apart from the end-use of energy, this is also a point where we can check on. Additionally, we have data on the amount of installations.
FN	Basically, you have annual sales that you have to allocate to the various categories. So how do you allocate them, do you consider the copper content? Is this close to reality, or do we just accept this as an abstraction?
PVT	Yes, of course this is an abstraction. In first instance, we simplify and we crosscheck to see where the anomalies are; but also in the input data.
MF	Q: Why are you only considering copper cables and not aluminium cables ¹ too?
DE	A: Because we are only looking at indoor installations and it was mentioned to us that it was only copper.
SB	That is not correct.
PVT	This is what we had from market sales data.
SB	It is not only copper.
ES	It is not much.
DE	In the installers' inquiry, it was also mentioned that is was copper.
ES	Aluminium is used too.
PVT	Of course, this will certainly not solve our problem; it will make it worse. This will mean that we have more stock and other cables.
SB	Q: If you have to include the aluminium cables, do you increase the lengths or the amount of cables to reduce the losses in your calculations?
PVT	A: Not the losses, because we have to compare the standards of aluminium and of copper cables. I do not know if this will lead to more or less losses?
SB	Q: The total amount of cables in buildings will then be higher?
PVT	Q: In weight or in volume?
SB	If you add aluminium...
PVT	A: Aluminium in weight for the same resistivity I guess it is lower.
SB	Q: You have taken the copper cables based on the stock. But if you have to add the aluminium?
PVT	A: Yes, we can have it on top, but we need to see what the stock and sales data were in the past. Of course, we need these data for the buildings and transporting the energy for the crosschecks we do. This means that we have more cables to transport the same amount of energy, and that the cables are lower loaded or unloaded probably. There are also other parameters that we can change, such as the length of the circuit and the number of circuits per area.

¹ Post meeting remark from BG: BG would be happy to challenge the member companies of the European Aluminium Association AISBL regarding the use of aluminium inside buildings in Europe, if more detailed information would be provided from the installers who use aluminium power cables or stakeholders who put aluminium back into the discussion.

abbr.	Comment/answer
SL	[Q on slide no. 88:] The product price is this the total costs paid to buy the cables?
PVT	A: Yes
SL	Ok, because probably the term 'total cost' would be better.
PVT	Yes, but I think this is standard terminology in the Ecoreport.
DE	And here we talking about a circuit as the product, so the price is per base case unit.

abbr.	Comment/answer
SB	[Q in slide no. 90] The 904 TWh for services and 1030 TWh for industry, why do you only attribute them to distribution and not to all of the services or all of the industry?
DE	A: In the distribution circuits, it is 100%; so the 904 is going to all the distribution circuits. This is the top level. To the lighting there is only 10% going of the 900 TWh. Even if you add all the energy losses or transport in an average circuit it could be higher, than the energy consumption at European level. Because it going to two circuits, first through the distribution circuit followed by the lighting circuit. So, you have two times the losses. And if you add them up you have two times the energy transported.
FN	Q: But then in industry, there is 15% left that is going somewhere that is not in the picture.
PVT	A: Correct, the sockets.
FN	I mean it also reveals the losses.
DE	The losses indeed. Maybe we need to add more base cases, which is one of the solutions: one for sockets, one for lighting in the industry.
FN	Or at least, if it is close to the distribution that it goes somewhere.
DE	But, we cannot also say over here in this crosscheck that 100% is going to the dedicated circuits.
FN	Q: This is an abstraction.
DE	A: Yes, it is.
SB	Q: Sockets are included in the dedicated circuits?
DE	A: Actually, as a circuit it is not. The copper of the sockets is in lighting.
PVT	In this model, the lighting circuit models are included with the sockets as base case 1. This is a simplification, but this does not explain the big TWh.

abbr.	Comment/answer
FN	The two categories of inputs for the model, there are factual data, like annual sales and the measured energy transported; then we have assumptions, like the length and cross sections. You need to make a distinction between the factual inputs and assumptions. The factual inputs need to be respected, because they are measured. So if adjustments are needed, adjust the assumptions for the model not the facts.
PVT	The lifetime of the cable is also important. If you have the sales data and the lifetime of the existing stock...
FN	The lifetime is an assumption.
PVT	Yes, and we all agreed that 14 years is low; but we already have a stock that is too high for the energy consumption. This is the paradox that we have found. We thought the 14 years would be safe, otherwise the stock would be larger and the amount of TWh and the losses. Currently, the stock is a result of sales data multiplied with the lifetime; but this is assumed.
DH	Q: When we are talking about product lifetime, the existing stock is supposed to increase by 2 or 3% annual. If you calculate that for over 20 years' time that will suggest that you will have 50% more cables than that we already have in our buildings. That seems relatively too high. Maybe you should look into that. How did you calculate the stock increase?
DE	A: It is calculated with the 14% building renovation rate and the 1% new buildings.

DH	Something needs to be subtracted from that.
PVT	Yes, this model is already simple. It is static, thus the growth rates are not in there. But indeed, this something that we need to look at.

- **Data gaps identified to complete the study (DE) / Discussion on approach to fill data gaps and the potential launch of a new enquiry (All)**

Besides adding base cases, the data that we have used should also be validated. We have listed some data gaps [slide no. 95-100]. We hope that we can get more input on this; of course, we can aggregate the information and sign a confidentiality agreement.

abbr.	Comment/answer
CS	[Q to all the stakeholders:] Are you intending to send some data, or are you thinking about your lawyers already?
SL	A: The lawyers are always in our mind; in any case, we will try to find more data that is suitable for this.
SB	We will ask if it is possible to get data from the different manufactures. Even if we provide information, I do not know how much it will represent the sector, maybe 50 or 70, 80%.
SL	It will be difficult to raise information from the whole sector and that is usable for this kind of study.
CS	Well, if you cannot get it, no one can get it.

abbr.	Comment/answer
SL	Q: What do you mean with monitoring the energy?
PVT	A: Yes, monitoring the energy that is linked to the cable. In a factory, this would mean the loads and how much loads there are going on and off..
SL	This data can possible be asked from the installers, because they will also know the dimensions of the installers.
PVT	Yes, but there is also a standard for this and we can ask how much the standard is applied, as the architect can be different from the installers.
SL	In the case of the high voltage cables, are you looking at the cable makers who also install cables?
PVT	I think the study from the copper institute, was done by such a company.

abbr.	Comment/answer
SL	It would be useful to have a list with all the missing data.
PVT	Ok, we will circulate this.

abbr.	Comment/answer
FN	I think there are a number of companies that do energy audits, monitoring campaigns and service companies. I do not know If partnering with any of these companies could provide us with advice.
PVT	One of our activities was that, but the main problem with that they are always focussed on the most energy consuming circuits.

- Any other business

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- **Planning and Closure (all)**

abbr.	Comment/answer
CS	Q: Paul, can we discuss the next steps in the study?
PVT	A: The most important thing on the short term is to see which data that we have and make a short list of the data that we are still looking for that we can circulate to all the participants of this meeting; in order to define the data gaps and possible solutions. This needs to be done before the end of June. The planning is that we have new input data for new calculations, optimisations, and the new scenario's at least at the beginning of August, in order to produce the first draft outcomes and to hold the third stakeholder meeting by early November.
CS	This means that you will have circulated the drafts for weeks in advance. The beginning of October?
PVT	Yes, the beginning of October.

Data of next stakeholder meeting: Thursday 13 November 2014.

abbr.	Comment/answer
SL	Q: Is it possible to have an idea of the future steps after February 2015?
CS	A: How this works is, that the burden of proof is on the Commission. So, we need to make the case that regulation or Ecodesign labelling makes sense. So far, I am not convinced myself. Maybe this will be changed by February. So yes, there is a potential for saving energy, but maybe Ecodesign regulation is for this not the best way of doing it.
SL	Q: Will there also be public consultation in February?
CS	A: Only if a regulatory proposal is on the table, then we will do the next step, which is consulting the member states, industry, environmental NGO's and consumers. But, if we are not convinced ourselves, there is no point in continuing the consultation forum. It could be that there is still something to do on the standard site and that it will be discussed further, to discuss whether we need to mandate or not.
SL	Q: That will be some months more on top of February?
CS	A: At the moment there is no regulation on the table, so there is less pressure. Standards are ongoing and we can take advantage of that.
SS	I understand that all the options are still open. For the record, as an environmental NGO, we perceive very clear distinction between the legislative procedures and normative procedures and the way they are formulated. Specifically, I am referring to the fact if there is a legislative proposal that is taken to consultation forum in which member states and other stakeholders have the opportunity to react; where in as in the standardisation processes, environmental NGO's and consumers might not have access to consult. So, if there would be requirements set on energy efficiency, we would prefer if they were set in a more transparent process such as the one under the Ecodesign Directive. This is obviously informative.
CS	Maybe I can explain how the framework works. One of the reasons why Ecodesign Directive is working reasonable well mainly for households products is that there are targets on European level for energy efficiency. And the Ecodesign Directive makes a small contribution towards these targets. All this is modelled, so you can see how much of the overall target the Ecodesign of boilers for example represents. With regulation, you have a certain reassurances that those savings will be materialised, because you will have shift in the market. When relying on a standard, the standard my help products to become more efficient but you do not have reassurance, as it will be left to the market. So that is these

	distinction between having regulation and a standard, or having only a standard. Because of the binding target of 205, there is a pressure on Ecodesign to deliver parts of those savings.
SL	It will be necessary to avoid inconsistencies between standards and regulation; otherwise it will be impossible to act.
HM	That is not the problem. The message is that standardisation is voluntary and we are talking about targets to be finalised by 2020, and we are talking about products with a lifetime of, 30, 40, 50 years.
JP	It needs to be considered that pushing everything in one regulation is not always the best solution. Making regulations is sometimes not as efficient as to leaving it to the market to decide to go into the right direction.
HM	To clarify access to standardisation point, I will report this to CEN/CENELEC.
SS	No, we have access.
HM	Ok, than you have to come to the meetings.
SS	Of course, I accept your invitation; but we have limited resources. I wanted to point out that principal differences we have with accessing and explaining standardisation if voluntary in any case...
JP	Not for any case, for example in France, if European standards or CENELEC TC20 are published in France then it is mandatory in France by regulation, by law. So, it is not exactly always the same.
CS	The point is that the burden to reduce CO ₂ emissions and enhance energy efficiency has to be spread across economic and social actors, and if you leave it to the market than it is not clear who is in charge. There is too much at stake to leave everything to the market. That is why you need targets and need to intervene in markets. When we have to many doubts with delivering a regulation, you should refrain from delivering.