Ecodesign preparatory study on mobile phones, smartphones and tablets

1st Stakeholder Meeting

Venue: **Webex**, access details sent through e-mail
Date: July 13, 2020 (9.30 a.m. – 3.00 p.m.)

Minutes

Participants:

- Study team:
  - Karsten Schischke, Fraunhofer IZM
  - Anton Berwald, Fraunhofer IZM
  - Christian Clemm, Fraunhofer IZM
  - Gergana Dimitrova, Fraunhofer IZM
  - Marina Proske, Fraunhofer IZM
  - Clemens Rohde, Fraunhofer ISI
- European Commission, DG GROW:
  - Davide Polverini
- Organisations represented by registered Stakeholders for the meeting:
  - 1cc - Compliance Consulting, US Office
  - Apple
  - BAM Bundesanstalt für Materialforschung und -prüfung
  - Belgian Ministry of Environment
  - BEUC and ANEC
  - BSEF
  - Clariant Plastics & Coatings (Deutschland) GmbH
  - CLASP
  - Danish Energy Agency
  - Dell
  - Deutsche Telekom AG (DTAG)
  - DigitalEurope
  - ECOS
  - EEB
  - Energy Authority of Finland
  - European Chemical Industry Council - Cefic aisbl
  - European Recycling Industries' Confederation (EuRIC)
  - Fairphone
  - Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
  - FEICA
  - Free ICT Europe Foundation
  - German Federal Ministry for Economic Affairs and Energy
  - Google LLC
  - GSMA
  - IHOBE
  - IK Ingenieria
  - Industrieverband Klebstoffe e.V.

- Interel
- Korea Electronics Association / Pollet Environmental Consulting
- LG Electronics
- Ministry of Industry and Trade, Czech Republic
- Netherlands Enterprise Agency
- NVE
- Öko-Institut
- Panasonic
- Restart Project
- Runder Tisch Reparatur e.V. (Round Table Repair Germany)
- Samsung Electronics
- SHIFT GmbH
- SIRRMIET
- Sony Europe
- Swedish Energy Agency
- TCO Development
- Telefónica
- Umweltbundesamt, Germany
- University of West Attica, Department of Electrical and Electronics Engineering
- Vodafone
- Xiaomi Corporation
- Xiaomi Technology

Presentation slides:
Introduction Davide Polverini, DG GROW:
https://www.ecosmartphones.info/app/download/11427882774/DG+GROW+Intro+to+preparatory+study.pdf?t=1594909722
Task presentations, Karsten Schischke and Anton Berwald, Fraunhofer IZM:
https://www.ecosmartphones.info/app/download/11426298274/Presentation_1st_Stakeholder_Meeting_ecosmartphones_Fraunhofer.pdf?t=1594909671

Task 1 Scope

- **Belgian Ministry of Environment**: Scope: Apple watch, 'fitbits', connected wearables, folding phones ? Walkie-talkies?
  - **Study team:**
    - Walkie talkies are out of scope
    - Folding phones are definitely in the scope
    - Smart watches are not considered a smartphone when connected to a smartphone, but when the can be used for calls without a further smartphone, they would be in the scope
    - Fitness trackers, connected wearables similar to smartwatches: only in the scope if they can be used for calls without being connected to a phone
- **ANEC-BEUC**: Do you plan to assess, in a sensitivity analysis, secondary functions (such as taking picture, setting alarms, looking at the time...)? This will significantly influence the use patterns.
- **Danish Energy Agency:** Agree with the above point on functional unit. A sensitivity analysis for offline functionalities should be performed
  - **Study team:** Yes, highly relevant for the use pattern in two ways: how long is a product used, which influences how much battery is drawn, charging cycles, etc and when it comes to replacing cycles/upgrades due to certain features, which do not fulfil requirements/expectations any more. Not directly in a so-called sensitivity analysis, but it is taken into account regarding power consumption and aspects which influence upgrade decisions

- **ECOS:** On products that are out of scope, we note the exclusion of tablets with permanently attached keyboards. The major impacts of these products (as well as laptops) will still be those outside the use phase, so it will be important that this study also provides insights on the transferability of policy options for the products in scope of this study into measures that could be incorporated into the computer regulation (Commission Regulation (EU) 617/2013).
    - **Study team:** the question is what is the difference between such tablets and a notebook. Keyboards as such have specific reliability issues which would shift the focus from the core questions of tablets and smartphones. If you have permanently attached keyboards, the computing part could move into the keyboard part making the differentiation with notebooks difficult.
      Davide Polverini has clarified earlier that it is the intention that there is a consistent policy in place later without overlaps and without grey areas.
- **CLASP:** The regulation for computers is still under review – is there some collaboration with DG ENER to discuss tablets and where they should be covered? #scope
    - **D. Polverini:** from the Commission side, we are in contact with colleagues of DG ENER, timeline is kind of parallel so that both product groups can benefit from the findings, preliminary agreed approach: all regulation on smartphones would also cover tablets
- **ECOS:** The upper screen size limitation should be carefully considered taking into account the need for ecodesign regulations to be adaptable for future technology developments. Whilst we recognise that the current definition is aiming for consistency with ENERGYSTAR, it should be noted that there are already tablets bigger than this screen size that should legitimately be included in scope. For example: 18.4 inches: https://www.samsung.com/uk/tablets/galaxy-view-18-4-t670/
    - **Study team:** It is not the intention that devices move out of the scope by becoming bigger. We had the impression to make a limit to not include bigger touch screen displays for totally different purposes, but we try to include the devices, which are just slightly larger and are clearly tablets. The scope needs to be revised accordingly.
- **ECOS:** How will this one year of use functional unit be used in the modelling and what is the rationale behind it being chosen? It is important to choose a functional unit that will take into account secondary use and/or repair, so a longer period e.g. 4 years would appear more suitable
    - **Study team:** misunderstanding, it is not assumed that the device lasts 1 year, but one year of use is point of reference in the analysis, so when there is a 4 years lifetime, ¼ of device production and end-of-life impact would be assigned to the one year of use
- **Belgian Ministry of Environment:** A landline phone# is powered over the 'landline'? Is this network/operator equipment relevant?
    - **Study team:** There are landline phones which are powered over the landline, but these are normally corded phones. DECT phones normally come with an EPS to power them/the charging cradle. Network equipment is relevant for the system analysis, but not for the product as such. So it would not be analysed in detail.
- **Interel:** How does the EPS consideration in this study link to the efforts of introducing a common charger dealt by the preparatory study in the Working Program 2020-2024? #chargers
- **Belgian Ministry of Environment:** The EPS topic is specifically interesting. You should liaise with the EPS study later (see working programme).
    - **D. Polverini:** Various analysis from commissions services. Study team analysis could e.g. assess the impact of products that are brought to the market without the charger. Consultants are asked for the environmental and economic analysis.

Task 1 – Testing Standards

- **TCO Development:** We would be happy to help out with knowledge regarding battery testning and durability. There are a LOT of important things that is not included in the standards.
    - **Study team:** information would be appreciated.
- **Öko-Institut:** Did you also consider reliability standards developed for instance by the IEC TC56 on durability? E.g. IEC 61649, IEC 61710, IEC 60605-6 etc. They may be interesting for measuring reliability parameters, such as B-10 values, Parts Count Analysis or Parts Stress Analysis etc.
- **Belgian Ministry of Environment:** What Öko-Institut suggests on reliablility assessment (B-10 values etc) seems interesting.
    - **Study team:** Yes, these standards should be included. However, the mentioned standards are on the statistics of the tests, for now the focus of Task 1 is more on test conditions. So the named standards are more important for how to interpret and evaluate test results statistically.

Task 1 – CEN/CENELEC Standards

- **Öko-Institut:** Would GHG protocol ICT sector guidance, in addition to the mention ETSI Standard on LCA, be relevant? Or is ETSI more comprehensive & precise for smartphone?
    - **Study team:** GHG protocol ICT sector guidance is more focused on services. ETSI is more precise for smartphones. Although the ETSI standard contain a disclaimer, that not all requirements can be fulfilled currently. But we consider it the current benchmark for LCAs of smartphones
- **ECOS:** In reference to durability and the chart you showed: Could you confirm that the first limiting state (repair) will be included within the lifetime of products examined in the study? (Slide 19/20)
    - **Study team:** Lifetime for task 5 analysis, there we will use the average life-time/use-time, which does not automatically means reaching a limiting state. Products might be replaced without reaching a limiting state.
- **ANEC-BEUC:** Could the durability and repairability standards be used to overcome/complement the limitation of MEErP when it comes to assess material efficiency?
    - **D. Polverini:** Preliminary answer: no. The useful outcomes of horizontal standards are typically common terms, definitions and testing and calculation methods for the assessment of compliance. For the MEErP we need a methodology to assess different design options featuring different of durability or assess societal impact.
- **ECOS:** What about pay offs between waterproofing/dust ingress vs disassembly? How will these be handled?
    - **Study team:** It is difficult to quantify the pay-offs. First reflections on the topic also with the JRC were made, but for now only on qualitative level.
- **Belgian Ministry of Environment:** The limiting state of obsolete operating systems# should be included (i.e. no Android or Apple OS upgrade is provided for a phone model). The number of updates/upgrades varies. Open software standards may help. You could for example flash Lineage OS. But manufacturers and Google / Apple make this very difficult.
- **University of West Attica, Department of Electrical and Electronics Engineering:** The issue of durability and especially the repairability is of paramount importance, as the devices must be repairable. Also after the 2 years of warranty the repair should be done by everyone (open market and increased employability)

Task 1 – other relevant Standard, labels, initiatives

- **DTAG:** Is there a way to reconcile water-proofing and disassembly by suitable technical design which gets us out of that trade-off?
    - **Study team:** We are restricted with design option which are already out there. We will not redesign a product and bring up design options which are not yet discussed. If anyone is already aware of such a technical design, information would be appreciated. We will have a look at current patents again.
      If anyone is aware on new design options in general which have a positive impact on material efficiency, please let us know.
- **TCO Development:** Note: our certifications name is TCO Certified
  Regarding the lack of Certified smartphones: We are testing all models that are Certified and do not allow any self declarations.
- **ECOS:** It's worth noting that many EPEAT requirements are very easily met and are sometimes not so tightly defined, so Ecodesign would need to go further.
    - **Study team:** There is only a limited number of smartphones from brand name companies in the EPEAT registry focussing on the US market. The level of verification would require more precision. Requirements would need to be interpreted in the European context.
- **TCO Development:** All products that are TCO Certified have been tested by a third independant part.
- **ANEC-BEUC:** The revision of the Battery Directive is also very relevant for this product group, especially since they are aiming at integrating environmental requirements, including durability
- **Danish Energy Agency:** For legislation, is there a reason why the battery directive is not mentioned in this study? Possibly because it is under revision, but still very relevant for these products
- **Öko-Institut:** I don't see battery directive (2006/66/EU) in the list....
    - **Study team:** yes it is relevant and should be reflected in the study
- **Belgian Ministry of Environment:** As mentioned the common charger (EPS) topic is also relevant.
- **Interel:** The Preparatory Study for ED/EL Working Programme for 2020-2024 mentions "universal batteries for battery-driven products" among horizontal measures. Would this be also considered for product categories under this preparatory study?
    - **Study team:** Our understanding is, that this "universal battery" issue mainly refers to power tools and similar applications. The more precise scope however has to be defined first by the ED/EL WP, then by a possible preparatory study. The smartphone study cannot address this as this is a horizontal issue.
- **Belgian Ministry of Environment:** For batteries, replaceability and availability of spares seems more relevant.

Task 2 – Markets mobile phones

- **Öko-Institut:** Lifetime of 3 years may be an overestimation. The reason is that a lot of background data reflects the usage of iPhones (coconut battery). iPhones are generally used longer (high-price segment; and strong refurbished market).
- **ECOS:** Supporting the point raised by Öko-Institut regarding average age of devices in use: Particularly for smartphones, the age of batteries is not a good indicator of the average age of devices in active use as they frequently need replacement. That the vast majority of device batteries in the database were less than two years old, is an indication of the normal battery life, not the age of the phone (iPhone battery life is generally understood as being around 2 years, so it would actually be unusual to see many batteries beyond the 2 year

mark as a result). The frequency of iPhone battery replacement makes this analysis misrepresentative.

- **Öko-Institut:** Using this data may be biased as iPhones are generally used longer (high-price & strong second-hand/ refurbished market)?
    - **Study team:** Assuming batteries are replaced regularly would indicate that the devices are even older. Regarding three years being an overestimation: the analysis of iPhone data suggests a lifetime of 4.1 years which is already much longer than the average 3 years. Also other data points indicate that 3 years seems the best educated guess. But for sensitivity analysis, we will also look into longer and shorter lifetimes. However, for the later analysis, it is crucial to have robust data on the lifetime of the devise regarding material efficiency questions, e.g. repairability. This needs robust data points on which the assumptions are based.
- **Belgian Ministry of Environment:** As you want to calculate number of devices in stock and sold: Does 'individuals' include children? Does this include second hand and old models?
- **Öko-Institut:** Supporting Bram's point on the second hand usage! How good is the data on second hand use/ reuse? Looking at the information on replacement cycles provided in the study, even the actual use time assumed in the study looks at a higher side, i.e. probably an overestimation....
    - **Study team:** Second hand is included in the model and plays a role. Small analysis on eBay is included. In the EuroStat data it is not differentiated between new and re-used phones. Exports might cover a number of used devices. If children are included depends on the data point from different sources, for some it is explicitly excluded, see the headings of some of the graphs.
- **DTAG:** If the number of phones is higher than household members, is there indication whether these are being used or do they rest in drawers?
    - **Study team:** Data from Bitkom suggest that they rest drawers. The question is why. If these are privacy issues, it could be addressed. If they are stored purposefully as spare devices, data storage, etc, it can hardly be addressed through ecodesign.
- **ECOS:** Could you please clarify how the average age in use will be used in the study modelling?
    - **Study team:** (Slide 35) We want to end up with a number on how long are devices in active use (including second, third use, etc.). Other data points such as average age, replacement cycles, etc. are only indications where we should target at for the average active use. The stock model only takes into account the three years use active lifetime. But to understand the market it is important for the analysis how people decide whether products are replaced, re-used, end up in a drawer, etc.
- **DTAG:** What is the indication whether a 2nd use actually happens or is that just a target picture?
    - **Study team:** For now, this is just to clarify the terms. The actual years of use should be determined. In that case it does not matter if this contains of long first use or first and second use. But it is important if products are kept or fed into the second-hand market and to understand the dynamics. Currently we do not have a full picture, but some information from eBay data and consumer surveys.
- **DTAG:** Do we have indication how many devices are in hibernation? There are figures from the BMBF whether those exceed 100 Mill. in Germany. How accurate are these data according to your view?
    - **Study team:** More recent data from Bitkom indicate higher figures, but do not specify whether the devices still work or not.
- **DTAG:** This graph shows there is a fixed replacement rate, what happens with devices leaving stock?
    - **Study team**: (Slide 36) Devices leaving the stock are not accounted for here anymore. They might go into recycling or hibernation. This is not reflected by the stock, which is just about devices in active use.

- **DTAG:** The problem is the business model in the industry which doesn't foster yet 2nd use save a few exceptions.

Task 2 – Markets cordless phones

- **Belgian Ministry of Environment:** Landline phones are replaced, at least in offices, by Skype on computer. Also with mobile phones, I suspect, fixed phone use will go down very quickly. Why would you carry around a smartphone (with WiFi + Skype/Whatsapp/...) and a DECT ? And why pay 2 subscriptions ?
- **DTAG:** Cordless devices are longer in first use because innovation cycles are longer and business models behind are different. Actually comparing your slides 35 and 45 already corroborates my earlier statement.
    - **Study team:** Information and data on that would be appreciated.

Task 2 – Markets tablets

- **Free ICT Europe Foundation:** Is their data about the use of tablets for professional use versus consumers? (Slide 53)
    - **Study team:** The data on slide 53 is from a survey, which doesn't differentiate private and professional use. We do not have much data on the share on how many devices are in private and how many in business use. It would be important to know that, especially on hibernated devices which is unlikely for business devices. Data on that share would be very helpful.
- **ECOS:** There is a lack of coherence in the figures quoted for replacement cycles for tablets compared to the active use lifetime. Figures for replacement cycle are higher than those for active use lifetime, which does not make sense if it is assumed that tablets have multiple use lifetimes = two + replacement cycles within the active use lifetime. More data is needed, or at least rational assumptions that correct for the lack of coherence in the data listed.
- **ANEC-BEUC:** To back up Catriona questions, how are you going to account for the margin of errors on lifetime calculation?
    - **Study team:** Correct, data is not always coherent here. Active use time should be longer than replacement cycles. We are happy to adjust data were it makes sense. We also took that in account in one of the scenarios. We continue to make such kind of sensitivity analyses. It has to be matched with the number of users. It might be the case that almost all tablets ever brought to the market are still in some kind of use (family re-use, semi-hibernation, etc.). But to sum it up, there are some inconsistencies in the data which could not be completely solved yet.
- **ECOS:** Again, how will average age of devices in use, replacement cycle and active use lifetime be used in the modelling? What is the methodology?
    - **Study team:** (Slide 35) We want to end up with a number on how long are devices in active use (including second, third use, etc.). Other data points such as average age, replacement cycles, etc. are only indications where we should target at for the average active use. The stock model only takes into account the three years use active lifetime. But to understand the market it is important for the analysis how people decide whether products are replaced, re-used, end up in a drawer, etc.
- **Belgian Ministry of Environment:** Is a Nintendo Switch classified as a tablet?
    - **Study team:** We would look at the specification from the manufacturer. But such examples are helpful to challenge our definition of the scope. *Follow-up: The technical specs seem to match with those of the tablet definition in the Draft Task 1 report – except for the display size criterion. Size rather corresponds to a "smartphone", but the voice communication feature is missing. Scope has to be*

refined to decide whether such handheld game consoles are covered or not. Note, that an SRI for game consoles is in place.

- **Belgian Ministry of Environment:** Tablets are also used for certain specific tasks (e.g. instructions in production lines). Would this significantly influence numbers?
    - **Study team:** We don't know by now. We only assume for now that it is a smaller market. It also depends if it matches the scope definition which mentions internet connection specifically. This might not be the case within production lines (only to local LAN) so that these tablet might fall out of the scope.
- **TCO Development:** Is the data based only on iPhones and iPads? If this is the case the data will be extremely biased towards the premium segment and not representative to the overall market and bulk of sales
    - **Study team:** The data point "average age of devices in use" is based on data from one study only, which includes data on average age of iPhone / iPad batteries. This is used as a proxy for device age, with given limitations that battery age is not necessarily equal to device age (device may be older than battery after a battery replacement). If you are aware of additional data on this, we are happy to include it.

Task 2 – Markets trends

- **Belgian Ministry of Environment:** With 5G more will go to the Cloud, and not on the device?
    - **Study team:** Might be the case. It is interesting to analyse. There are also phone providers who promote "store everything in the cloud and not on the phone". Nevertheless, we see the trend that there is more and more storage in the device. There are pros and cons for both directions and it will be interesting to analyse this from an environmental perspective. We will address these trends in the coming work, but it remains to be seen how this is related to product design.
- **Belgian Ministry of Environment:** Could phones be enabled with 5G by e.g. switching the SIM. Is that technically possible? Could that lead to products with limited internal storage to be used longer when they use cloud storage.
    - **Study team:** The hardware has to be added to the phone, so switching to 5G is not that easy technically. 5G could make some older devices obsolete, however the older network generations are not switched off immediately. There are still devices and traffic running on 3G and the mobile networks exist in parallel.
      Cloud storage is not necessarily connected with 5G.
- **ECOS:** To what extend will energy and material impacts of infrastructure related to mobile phones and the increasing shift of data and processing to the cloud be taken into account in the study?
    - **Study team:** System aspects will be analysed, but not in detail. However, we are supposed to analyse eco-design options related to the end-devices. Of course, this should not lead to shifting the burden into the network/cloud, but we will not look at eco-design options to improve the cloud or network.
- **TCO Development:** Any thoughts regarding privacy and how it might impact the decisions of eco design?
  Will you look in to standardize data erasure and make it mandatory to help with the increase of reuse? Will you investigate cloud vs on device storage and the eco benefits between the different methods? No need to reply now, see it as food for thought
    - **Study team:** Data erasure at end of life is relevant as there are strong indications that distrust in data erasure at end of first life limits re-use and recycling. Privacy of data in the cloud does not seem to have a direct correlation with eco-design measures.

Task 2 – Consumer expenditure data trends

- **ECOS:** Different specifications of the same device may account for the higher apparent price of refurbished versus new devices - i.e. perhaps refurbished device of higher specification (memory etc) is being compared with a new device of lower specification?
    - **Study team:** No, the specifications were specifically addressed in the comparison. Therefore, the data seems counter-intuitive.
- **Öko-Institut:** From the perspective of economic & psychological obsolescence, consumers would be more willing to repair/ replace batteries & displays for products with high sales price, irrespective of high repair costs. The problem is relative high percentage of repair costs for products with low sales price....
    - **Study team:** Yes, the relative price is definitely important for the users. Opportunity costs play definitely a role.

Task 3 – Use phase (battery life, use patterns, repair)

Comments:

- **ANEC-BEUC:** Consumers feel that their battery performance declines over-time. On top of ageing of battery, one aspect that should be considered is that over time, you have more apps, you follow more people on social media (more notifications...). This is something that should be input to ageing simulations (our members are trying to reflect that in their testing, but with limited success)
- **TCO Development:** We have a lot of data regarding batteries and contacts with experts. Happy to share in separate meeting
- **DTAG:** As state-of-art in the industry regarding cycling robustness for Li ion batteries is >80% of the initial capacity after 500 cycles, some batteries even make 800 cycles. Scientific literature for those questions may be found in J. Power Sources, J. Appl. Electrochemistry, J. of Electroanal. Chem., Electrochim. Acta.
- **TCO Development:** From looking at over 300 tested batteries I do not agree with the above 80% after 500 cycles. This is for notebook Li ion batteries. There is a lot of claims going on that doesn't reflect reality.
- **DTAG:** We request that as requirement for Smartphones and get mostly full compliance.
- **TCO Development:** To DTAG: is this data 3rd party verified or only declared by the brand?
- **DTAG:** Batteries depend on reversible electrochemical reactions. There is a small percentage of irreversible reactions that reduce capacity over time. This is driven by electrode potentials, usually this depends on the end voltage of charging. The higher that one the higher the percentage of irreversible reactions driven by the resulting higher potential of the anode driving for instance electrolyte decomposition.
  There are tests to measure that and we ask to conduct such tests and share the results. One important point though, Li ion batteries are very sensitive to manufacturing conditions, even traces of moisture are very detrimental to cycling robustness. My statement relates only to those batteries which have been manufactured under fully controlled conditions. Statistics may be distorted when batteries are included not manufactured under those conditions.
- **ANEC-BEUC:** Batteries ageing #
  Some of the members from consumer organizations made a study on ageing of batteries and there was no indications that charging patterns and behaviour have an impact on the ageing of the batteries. Unfortunately, there is no report on that.
- **Restart Project:** We're currently analysing data from 1200 smartphone repairs at community repair events, as collected with the Open Repair Data Standard. We'd be happy to provide this dataset

- **Öko-Institut:** I agree that defects do not always lead to repairs but rather to replacements. Costs of repair are an important limiting factor for repairs. Therefore, reducing the repair costs will be important...therefore, keeping up with the repair-related requirements that improve the independent repair sector, as done recently for few product groups, will be necessary....
- **DTAG:** The cost of repair is dependent on various factors: the factorability determines the labor cost of the technician; policies of suppliers determine the cost of spare parts. We see some leverage in both aspects.

Questions:

- **Umweltbundesamt:** Is data protection not an important consideration when deciding for or against repairing a device?
    - **Study team:** It is an important factor. There is a data point already in the discussion paper. Further insights would be helpful.
- **Free ICT Europe Foundation:** An important stream is repair/refurbishment after the first use, also outside the OEM channel. Is there input provided from this sub-sector.
    - **Study team:** Not yet. Information would be appreciated.

Task 3 – Use phase (hibernating devices, ..)

Comments:

- **ANEC-BEUC:** Consumer organisations are now tracking the availability of software updates (functional and security updates, when acquiring the products. For Android, it is limited to 2 years. This limits the endorsement of refurbished smartphones by some of our members. This is a key issue of software obsolescence. We will share with you the data.
- **ANEC-BEUC:** The update policy of OS can also help you define product lifetime: 2 years for Androids (so the biggest of the market) and 3 to 4 years for iOS.
- **Restart Project:** @Q 3-9: Android usage data shows that 40% of devices (worldwide) use unsupported software (meaning no longer supported by security updates), according to Google data.
    - **Study team:** A link to that data would be appreciated.
- **ECOS:** @Q3-10: We consider this question very relevant to premature obsolescence and suggest that for both mobiles and tablets the most commonly downloaded new apps are analysed to determine what OS version they are compatible with and map this to which OS the different generations of devices are operating at, to derive insights on the time period within which app developers stop supporting older devices.
- **Restart Project:** A related question could be whether there's any disincentive from OEMs to app developers to support older versions of OS - for example technical requirements making it harder to do so.
    - **Study team:** Important, but tricky because it addresses third parties (app developers). There seems to be no eco-design option related to the end-user device.
    - **D. Polverini:** All eco-design measures will be on product level. Upgradability of e.g. firmware could be such a measure related to the product.

Questions:

- **ECOS:** Could you clarify how hibernated phones will be taken into account in the modelling (in stock figures)? They will still be relevant for end of life aspects even if not used.
    - **Study team:** These hibernating phones are not taken into account for the stock model. We nevertheless look whether the devices are probably returned or not. Sooner or later they might come back to recycling and are not yet lost for recycling. However, this is hard to address with the current eco-design measure which

are under discussion here. There is a study going on regarding take-back systems. Hibernating is especially relevant for still functioning devices as the devices become old in hibernation so that they are lost for the re-use market. Incentives for consumers to feed these products into the re-use market could be an eco-design option analysed within our study. Security and privacy issues play a role here.

Task 3 – Use phase (EOL)

- **DTAG:** The figure I got across is that just 10% of sold Smartphones are returned. The whereabouts of the other 90% are unknown.
- **Free ICT Europe Foundation:** If I remember right the EERA, European Recyclers Association, reported to have received only 7.5% of the expected volume in laptops/tablets/phones.
    - **Study team:** Source of that data would be appreciated.
- **ECOS:** Q3-13: It would also be useful to carry out an investigation into the current availability of data deletion software built in to smartphones / tablets and the level of information provided on this to the user, (as well as the costs and secure deletion capability of pay-for apps for data deletion) as this can be an important reason for devices being "hibernated" rather than reused or recycled.
- **TCO Development:** I agree on the data deletion comment
- **Netherlands Enterprise Agency:** Regarding IOS instructions on deleting data, see Apple website. So, for at least a significant part of the market deletion of data is simple.
    - **Study team:** This will be addressed. We also have worked in the past with data erasure companies. Apps for data erasure are an option, but to not solve the problem for broken devices.
- **DTAG:** Same as reparability: Ease of factorability is key. The labor cost to disassemble can make recycling uneconomic.
    - **Study team:** Agreed.
- **TCO Development:** We have contact information to both recyclers in Europe and in Nigeria/Ghana that might be able to provide data. Happy to introduce you.
    - **Study team:** Export to Africa seems to be for smartphones mostly for re-use and less for improper recycling. Input or information on that would be appreciated.
- **Öko-Institut:** I can confirm what just Karsten said on smartphones recycling in Africa....
- **TCO Development:** I do have input for the recycling of phones in Ghana/Nigeria. We have been working with a company called Closing the Loop from the Netherlands that focus on collecting phones in Nigeria and Ghana. They will be able to give you insight regarding recycling in the developing world.
- **Restart Project:** Q-13 there's another aspect: recyclers have highlighted to us growing concerns on perfectly reusable devices that can't be reused and end up being recycled prematurely due to software locks preventing this. This should be addressed.
- **DTAG:** At the end it boils down to changing the business model to reduce hibernation.
- **TCO Development:** I think there should be a focus on product traceability also and how eco design can make this become a reality. We are working with a project called KEEP focusing on this. Traceability through a product passport could help recyclers and repair shops and also consumer what they could actually still do with their products. Such product passports should be enforced to support such systems. The project focusses currently on smaller IT and will have a pilot on Notebooks soon, could be transferred to smartphones
    - **D. Polverini:** Digitalization of such data is discussed and analysed under potential horizontal measures ('product passport'). Under this specific study, information requirements on product-specific level will be analised, that can act as 'enablers' for the improvement of circular economy aspects (such as recyclability).

Task 4 – Technology Trends

- **ANEC-BEUC:** Is display size increase influencing the definition of the scope of the study? especially when it comes to foldable phones.
- **ECOS:** Developments in foldable screens could also have implications for scope in terms of the maximum screen sizes of smartphones.
    - **Study team:** It is not intended that by folding the phone it moves out of the scope. We try to make sure that these devices are still in the scope of the smartphone definition.
- **ECOS:** In relation to the foldable screen trend, it will be important that the modelling takes into account the potential for increased embedded impacts of smartphones (e.g. greater material use due to multiple or larger screens), plus how to mitigate risks of reduced durability (currently shown in early models) and more expensive repair.
    - **Study team:** These are critical factors. In task 5 base cases are analysed representing the "majority of the market" according to the MEErP. Foldable phones are not yet representative for the market. They are prominent in the media, but do not have a huge market share, so they will probably not be a base case. We will analyse option to improve the design. The MEErP methodology to not foresee to analyse specifically bad examples from an environmental perspective. However, we see the challenge to address that but it is not yet clear under which aspect.
- **ECOS:** My point on the increased impacts of foldable screens is of most relevance to savings of material efficiency policy options - they will potentially become much larger with foldable screens, making some ecodesign options potentially more feasible in future. Therefore it should ideally be addressed in sensitivity analysis. Bigger devices have a greater environmental impact, therefore the potential saving through eco-design measure will be greater.
    - **Study team**: This could mean defining a base case for a future mainstream device with bigger screen to get this addressed.
- **DTAG:** Already many adhesives can be loosened using heat. What is new with this thermally releasable adhesive? An adhesive releasable by photochemistry would be more meaningful.
    - **Study team:** There are various patents. This was used as one example for an adhesive. Adhesive are already under discussion if adhesives should be allowed under the aspect of repair/disassembly. We would appreciate more information on adhesive trends making disassembly easier.
- **Netherlands Enterprise Agency:** (referring to the patent on a modular phone) All discussions on what is the product should be solved with the definitions of "product", "part" and "component" in the ecodesign directive and the Blue Guide definition of placing on the market.
    - **Study team:** It could also be a question of addressing third parties – modules could be developed and sold by individual parties but with only some features, not a full smartphone functionality. The final device would only be combined by the consumers. So it is a question how requirements on the whole product might be transferred.
- **ANEC-BEUC:** How do you plan to address the shortcomings of MEErP when it comes to material efficiency but also integration of data/telecom infrastructure impacts (cloud…)?
    - **Study team:** In the system analysis the effects of infrastructure and cloud will be addressed. Only relevant in context of product design. No eco-design measures on cloud services are in the scope of the study. Questions if it is better to have the data on the phone or in the cloud will be addressed, but it depends also strongly on the user and is difficult to address with the MEErP EcoReport Tool.
      The MEErP methodology already gives the possibility to address lifetime extension measures. Therefore the functional unit of 1 year of use is defined. For some tech-

nical questions, the data base is not so robust, but for foldable phones the question is more to have reliable technical facts on the lifetime/durability of such devices.
    - **Davide Polverini:** Under the MEErP, it should be possible to compare material efficiency regarding different lifetime by normalizing results per one year of use and the accounting of societal impact.
- **DTAG:** In terms of recycled plastics, what do you think about the use of chemcycled plastic instead of present waste plastic processing which has significant limitations in new use (due to additives)?
    - **Study team:** The question is if this has an environmental benefit. Currently state-of-the-art is plastics from mechanical recycling, but it seems more important for other product groups with more plastic content. From an environmental perspective, use of recycled plastic will be in the range of 1% or less rudction in ewnvironmental impacts. Therefore, it is the questions if we should focus more on recycled metals and lifetime extension options.
- **TCO Development:** Have you looked into using accepted substance lists based on the methodology green screen instead of using restriction lists like RoHS and REACH? This way hazardous substitution could be addressed and better solved to create more clean material streams. We are using this approach for flame retardants and plasticizers in TCO Certified. A transparent accepted list can also help other markets finding better alternatives for better chemicals
    - **Study team:** This is also stressed under the EPEAT requirements. We haven't analysed that yet in detail. GreenScreen® is difficult from legal perspective as it would be a private entity as point of reference for regulation in the EU, but priority list of materials in general a relevant topic.
- **DTAG:** @TCO Development, In RoHS and REACH substances are limited known to be hazardous. In terms of an accepted substance list you have the uncertainty of different toxicological opinions on the same substance. How do you deal with that?
- **Cefic:** GreenScreen cannot be applied legally (you mentioned the reasons). It is more a voluntary measure for companies who want to go the extra mile...
- **TCO Development:** We have a public list with CAS numbers and name of the used chemical publicly available for anyone to read coupled with a green screen score. This can at any time be questioned by anyone if there are new data points that can be presented. All substances that go up on our accepted list have been analyzed by a verified third party. By doing it this way all flame retardants and plasticizers must be assessed beforehand which limits the risk of hazardous substitution If you were to go only with RoHS and Reach. But most important it creates a transparent system which can be questioned by anyone to keep it as up to date as possible and create a continuous drive towards safer chemicals used
- **Cefic:** The problem with accepted substance lists is that every time CLP gets updated, substances could get new hazard phrases...
- **CLASP:** On flame retardants: cf requirement in the TV regulation and ongoing discussions. I would recommend to get in touch with Paolo T at DG ENER
- **TCO Development:** @ Cefic: Of course, but the big win is that then everyone know what is in the products and if they do contain hazardous materials this will be public knowledge. Then it will be possible to remove the chemical from the list and now a better alternative must take its place for future products.
- **Cefic:** @TCO Development, sure, but this has to be discussed under REACH/RoHS.
    - **D. Polverini:** Aspects related of material selection or on certain hazardous materials can be seen as rather in the context of RoHS and REACH and not within the framework of eco-design.