**Comments on Tasks 1, 2 and 3 of the preparatory study on solar photovoltaic modules, inverters and systems**

July 2018

| No. | Contact Person/organisation | Reference:<br>- document<br>- section<br>- page | Subject of the comment | Comment |
|---|---|---|---|---|
| 1 | **Glen Wilson / ECOS + EEB** | - Task 1<br>- 1.1.2.3<br>- p.12 | PV modules maximum voltage | The last versions of CEI 61215 and CEI 61730 broadened their scope to PV modules with maximum voltage of 1500V.<br>This value of 1500V should be considered instead of the proposed one at 1000V. It would also be in line with the maximum voltage proposed for the inverters in the following sections. |
| 2 | **Glen Wilson / ECOS + EEB** | - Task 1<br>- 1.4.1.2.1<br>- p.92 | Interpretation of ecodesign boundaries | The interpretation of the boundaries of Ecodesign implementing measures is not consistent with the aims of the Ecodesign Directive. It is important that Ecodesign requirements are not limited to use-stage performance aspects only. This is especially important for resource efficiency measures.<br><br>Subtasks 3.1 and 3.2 (direct and indirect impact modelling), as well as Task 5 (assessment of environmental impacts) should also take consideration of this remark. |
| 3 | **Glen Wilson / ECOS + EEB** | - Task 1<br>- 1.4.2.1<br>- p.97 | PV modules product scope definition: frame vs degradation rate | The aluminium frame of a standard PV module accounts for about 5 % of the total $CO_2$ emissions of the entire PV system*, so manufacturers could prefer to sell laminate frames to lower the $CO_2$ footprint of the module, even though the framing provides mechanical strength and protects against external climatic conditions.<br>Along the same lines, very “cheap” modules (because of thinner glass, of quicker lamination process, of poor material quality…) won’t last as long as other modules, but will nonetheless pass the IEC 61215 and IEC 61730 standards.<br>As it would be very difficult to correlate module design with durability, it is proposed to require stricter testing than the standard ones to ensure that the displayed yield will last 25 years. It is suggested to use NREL work on this subject**.<br>Require mandate for 61215 standard evolution towards 25-year representative usage testing. |

| | | | | |
|---|---|---|---|---|
| | | | | ** M.J. (Mariska) de Wild-Scholten, Energy payback time and carbon footprint of commercial photovoltaic systems, Solar Energy Materials & Solar Cells 119 (2013) 296–305*<br>*** J.Wohlgemuth, S.Kurtz, Reliability Testing beyond Qualification as a Key Component in Photovoltaic's Progress Toward Grid Parity, NREL, 2011*<br>*https://www.nrel.gov/docs/fy13osti/57838.pdf* |
| 4 | **Glen Wilson / ECOS + EEB** | - Task 1<br>- 1.4.2.1<br>- p.97 | PV modules product scope definition | If AC modules or PV modules with advanced features such as DC optimisers are not included in the scope, manufacturers may prefer to develop AC modules for the residential segment (19% of EU total installed capacity). The current market environment could respond positively because of the enthusiasm of private individuals for self-consumption, which would lead to reduced power installed per home to improve matching between consumption and production hours, and therefore favour easiest set up (plug-n-play).<br>➔ AC modules should be within the scope of PV modules, with a mandate to update the 61215 and 61730 standards, and subject to a particular regulation when sold as plug-n-play kits. |
| 5 | **Glen Wilson / ECOS + EEB** | - Task 1<br>- 1.4.2.1<br>- p.97 | PV modules product scope definition | If less than 50 Watts PV modules are not included in the scope, manufacturers may have a preference to develop < 50 W modules for the residential segment (19% of EU total installed capacity). The current market environment could respond positively because of the enthusiasm of private individuals for self-consumption, which would lead to reduce power installed per home to improve matching between consumption and production hours. This could also be favoured by the increasing role played by large home appliance retailers in PV system commercialisation.<br>➔ The exclusion could be modified as follows:<br>*Modules with a DC output power of less than 50 Watts under Standard Test Conditions (STC) and not dedicated to direct or indirect grid-connection of PV systems.* |
| 6 | **Glen Wilson / ECOS + EEB** | - Task 1<br>- 1.4.3.1<br>- p.99 | Inverters product scope definition | Micro-inverters sold separately from PV modules are part of the inverters scope, as they perform the same function as string inverters. For AC modules, please refer to the comment above. |
| 7 | **Glen Wilson / ECOS + EEB** | - Task 1<br>- 1.4.3.1<br>- p.99 | Inverters product scope definition | *"Specifically excluded from this scope are:*<br>*Central inverters that are packaged with transformers (sometimes referred to as central solutions) as defined in Commission Regulation (EU) No 548/2014 on Ecodesign requirements for small, medium and large power transformers."*<br>The transformer Ecodesign Regulation does not include inverters in the product scope of "large power transformers", so central inverters packaged with transformers should be included in the present product scope.<br>In this type of equipment, the inverter and the transformer parts are physically distinct inside the shelter.<br>*See p58-59: http://www.energyka.com/media/CATALOG%20PV%202013%20EN.pdf*<br>➔ Include central inverters packaged with transformers in the present product scope. |

| | | | | |
|---|---|---|---|---|
| 8 | **Glen Wilson / ECOS + EEB** | - Task 1<br>- 1.4.3.1<br>- p.99 | Inverters product scope definition | As explained in Task 3 3.4.2.1 *Opportunities for batteries and demand response management to increase self-consumption* (p. 65), PV inverters with DC bus integrated batteries present a gain in efficiency compared to an external battery solution, so this type of inverter could become widespread in the coming years, with the growth of the prosumer market.<br>Inverters that integrate battery charge converters and/or DC-to-DC converters, and/or DC optimisers should be kept within the scope, provided that there is a parameter dedicated to storage function (not included in the proposed functional unit). |
| 9 | **Glen Wilson / ECOS + EEB** | - Task 1<br>- 1.4.4.1<br>- p.100 | Scope exclusions | We recognise the current lack of information on small PV panels used in consumer electronics and other gadgets and call on the commission to consider carrying out further analysis, possibly in the form of a separate study. It is important to consider the environmental impacts of these small PV panels too and to consider them in vertical Ecodesign measures (e.g. in measures on battery chargers, etc.)<br>While we recognise that panels for street lighting and street furniture might not deserve a regulatory framework as comprehensive as for grid systems, we disagree with the idea of leaving them totally unregulated. Some lighter and specific requirements could be designed for them. |
| 10 | **Glen Wilson / ECOS + EEB** | - Task 2<br>- 2.2 | Sales and stock figures | Throughout this chapter, sales and stock figures are only expressed in power. It would be good to have them also expressed in number of products, as it is an important parameter for Ecodesign considerations, discussions on material efficiency, and future discussions on potentials and scenarios. |
| 11 | **Glen Wilson / ECOS + EEB** | - Task 2<br>- 2.2.2.2<br>- p.14 | Graphs and figures | In this section, some graphs and figures need to be polished and better described. For instance, Figure 5 does not show stock numbers (but yearly additions to stock probably). The units are missing in the figure. |
| 12 | **Glen Wilson / ECOS + EEB** | - Task 2<br>- 2.2.4.2<br>- p.21 | PV system forecasts to 2030 | The most recent German tender on both wind/solar power large systems showed that only solar succeeded because projects were less expensive*. So, the proportion between wind and solar should rather be 1/3–2/3 and not the opposite. It would add + 562 GW in 2030 for the EU so 708 GW cumulated.<br>**See* https://www.pv-magazine.com/2018/04/12/wind-has-no-chance-against-pv-in-germanys-mixed-wind-solar-auction/ |
| 13 | **Glen Wilson / ECOS + EEB** | - Task 2<br>- 2.3.4.4<br>- p.60 | PV system distribution | With large retailers becoming providers of kits of PV systems for individual consumers, self-building may develop (for instance, a start-up is being created in France based on this concept). Therefore, obligations on distributors and installers must have the same level of requirements.<br>Concerning professional certification, the person performing the relevant task should be certified, not simply one person in the organisation. |
| 14 | **Glen Wilson / ECOS + EEB** | - Task 3 | General comment on the task | The structure of the report is a bit messy and not smooth to read. It starts with owner expectations, then continues with a description of technical parameters of modules/systems (which are not really related to 'behaviours'), then addresses "monitoring/maintenance" (also covering installation and installers), then end-of-life, and then it goes back to installers in subtask 3.4. |

| | | | | |
|---|---|---|---|---|
| | | | | It would be more logical to regroup the report and follow the chain of users: designers / installers or retailers / final users / recyclers, with each time a more thorough and homogenous analysis of their main issues and feedback from the field. It would help to identify the market barriers and failures that need to be tackled in priority. This is essential to understand how requirements, or a potential label can be implemented along the chain, who would be responsible, whether it should be a component or package label, etc. |
| 15 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.0.4.2<br>p.18 | Conclusions of consumer NGOs | The work of consumer associations is mentioned, but not their conclusions about the most frequent issues/barriers to solve. |
| 16 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.1.3.2<br>p.26 | Product approach for inverters & standby | The standby energy consumption of inverters should be taken into account. As a review of the horizontal Ecodesign Regulation for standby is about to be finalised, it would be very useful to quickly identify whether inverters could be added to the scope of this Regulation, so that their standby losses are minimised asap. |
| 17 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.1.4.1<br>p.27 | Extended product scope | Why are weather conditions linked to 3.1.4 extended product scope and not to 3.1.5 Technical system approach? |
| 18 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.1.4.1<br>p.27 | Climate zones definition | Table 6 p.30: the range of typical annual irradiation in kWh/m$^2$ should be indicated and used to define each climate zone.<br>*See* *http://re.jrc.ec.europa.eu/pvg_download/map_pdfs/PVGIS_EU_2012_presentation.png*<br>It should be clarified what use will be made of these climatic zones? For information, France presents a large range of irradiations and climates (snow presence in winter above 900m height, corrosive atmosphere near sea coast, 1150 kWh/m$^2$/year in Dunkerque vs 1630 in Marseille). |
| 19 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.1.5<br>p.33 | List of DR | Paragraphs seem to be missing on the following factors: DRarraywr, DRinv-fail. |
| 20 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.1.6<br>- p.35 | Summary of impact | Impacts are summarized for the design, maintenance and monitoring stages. These categories should also include the construction stage to bring out the responsibility of installers and EPC in the performance of delivered PV systems, and monitoring/maintenance could be grouped into a single category, as long as monitoring is a working tool of maintenance contractors (otherwise you could split maintenance into annual preventive maintenance and daily/weekly corrective maintenance). |
| 21 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.2<br>- p.41 | Indirect impacts:<br>PV/T modules<br><br>Nuclear waste avoidance | The possibility of heat generation with hybrid PV/T modules should be considered as it should lower the building fossil-derived heat need (in winter). It is generally made possible through a solar kit including tubes and fans (and no heat accumulator as mentioned in Task 1).<br>The avoidance of nuclear waste generation is also part of the indirect impacts, alongside $CO_2$ emission reduction. |

| | | | | |
|---|---|---|---|---|
| | | | Hazardous materials | *See N. Jungbluth, Life Cycle Assessment of Photovoltaics: update of ecoinvent data v2.0, EU, 2008*<br>Usage of toxic compounds should also be taken into account. On this particular subject, specific exposure limits for CdTe are not available. |
| 22 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.2.2<br>- p.42 | Indirect impacts:<br>Grid losses | Indirect impacts of PV systems on the grid cannot be restricted to avoidance or enhancement of grid losses.<br>Services that could be provided by PV systems to the grid to improve grid-connected PV penetration rates should be taken into account. Please refer to IEA PVPS Task 14 for more details. |
| 23 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.2.3<br>- p.45 | Consumption profile | The typical electricity profile on figure 23 dates from ten years ago and is no longer representative of actual profiles (e.g. lighting has decreased, and will continue to decrease with the ban of non-LED lamps this year). More recent data is probably accessible. |
| 24 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.3.2<br>- p.55 | Disposal financing | In the French national tenders of 2012 and 2013 for large systems >250 kW (respective volumes of 450 and 450 MW), a financial guarantee of 30 000 € / MW was required from applicants to ensure dismantling of PV installations, site reconditioning and PV module recycling. |
| 25 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.4.2.1<br>- p.65 | Smart-meters | An opportunity exists at the neighbourhood level to share local electricity production and consumption, through collective self-consumption models using a local grid loop. Even if a recent announcement in France made by the Energy regulator indicated that this electricity would be subject to taxes (and so not competitive with the electricity price), this could be developed in the future based on the usage of smart meters, or virtual meters. |
| 26 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.4.2.3<br>- p.67 | Inverter grid services | This paragraph deserves to be more developed as it is mentioned that ancillary inverter services can control (attenuate) indirect impact on grid losses. Among these services, we can mention: storage, AC power dynamic restriction, frequency or voltage support, reactive power management… |
| 27 | **Glen Wilson / ECOS + EEB** | - Task 3<br>- 3.5.2.2<br>- p.73 | Consideration of indirect impacts | It is questionable whether all the indirect impact analyses are relevant, because some of these impacts are independent of the performance & design of the product itself. The favouring of a better performing PV installation over another will not change e.g. neither the type of electricity substituted, nor overall DSM evolutions. The study should focus on those impacts that are really influenced by the choice of a component/system. |
| 28 | **Glen Wilson / ECOS + EEB** | - Standards<br>- 3.2.1.3<br>- p.20 | Table 3 | Missing standard:<br>CEI 62759-1 on PV modules packaging (real impact on module lifetime and easy to check on the delivered product). |

*Contact:*
*ECOS – European Environmental Citizens' Organisation for Standardisation*
*Glen Wilson, glen.wilson@ecostandard.org*