Guidance on the Energy Audit Requirements for the carrying out of the statutory energy audit by non-SME pursuant to Regulation 10 of the Energy Efficiency Regulations, S.L. 545.33.

This guidance note is addressed primarily to Energy Auditors who may be entrusted with the carrying out of such audits. Its aim is to expand further on the criteria as set out in Part 2 of the Fifth Schedule of S.L. 545.33.

Each of the criteria listed in the Fifth Schedule of S.L. 545.33 has been expanded in further detail to provide guidance on the detail and type of information expected from the result Energy Audit Report. This guidance note is to help Energy Auditors meet the required criteria for such energy audits and ensure the audit provides utmost benefit to the respective enterprise.

Regulation Criteria:	***be based on up-to-date, measured, traceable operational data on energy consumption and (for electricity) load profiles;***

- All the data since the previous energy audit (*or the last four years*) should be included and used
- All sources of energy used by the organisation must be covered in that time window (*electricity, fuel, oils, LPG, PV and others*)[1]
- The past trends in EnPIs (*as agreed with the client*[2]) based on this historical and current data, should be reviewed and interpreted
- Data values must be measured and not estimated
- A metrological measure of electrical load profiles (*based on the plant in place*) is advisable (*to uncover spots of wastage*)
- Evident significant energy-consuming systems, processes or equipment need to have their individual consumption patterns measured and identified[3]
- The measuring equipment used (*by the client or by the energy auditor*) has to be shown to be reading correctly and traceable (*by including unit serial numbers and calibration certificates or equivalent*)
- The data collected must provide a clear energy consumption pattern, not only for the organisation's overall totals of electricity, fuel, oils, LPG, PV and others, but it has to be broken down, at least, to the ***individual*** significant energy-consuming ***systems, processes*** or ***equipment***

[1] To better understand how the operational activities relate to energy consumption;
[2] If EnPIs are not in place, these must be established and plotted with the historical data and assessed and interpreted, prior to coming up with new opportunities for improvement;
[3] This is where most often consumption data is not available and has to be measured over a time window as part of the energy audit's measurement plan. It will also benefit the client to keep on measuring this even after the energy audit is over;

Regulation Criteria:	***comprise a detailed review of the energy consumption profile of buildings or groups of buildings, industrial operations or installations, including transportation;***

- The level of detail must cover ***all*** individual systems, processes and equipment ***sufficiently,*** as only in this manner can the waste from the latter be estimated or measured in a detailed fashion
- A *sufficent level* means that individual processes, systems and equipment are identified, grouped where necessary and then measured individually[4] over a span of time (*unless this is not being done already by the organisation*)
- "*consumption profile of buildings*" does NOT mean the total energy consumed by that building and what improvements to the building can be done to reduce energy loss from that building. Instead, "*consumption profile of buildings*" means *the energy consumption profile of each of all the processes, systems and equipment within that building that are consuming and wasting energy. (An energy audit is absolutely different, both in nature, content and scope, from the issuing of an Energy Performance Certificate for a building).*
- Processes in the service industry, operated by the organisation such as delivery and distribution, goods or people ferrying or transportation, air travel, have to be included as part of the energy profile of the organisation
- Outsourced processes (*both incoming and outgoing in the organisation*) have to be included in establishing the energy profile, particularly if these processes can be controlled or influenced by the organisation[5]
- The consumption profile must show, include and give a value *(measured or calculated or estimated*) for each of : (a) Energy consumed; (b) Energy used (c) Energy wasted
- The equation of **Energy Consumed = Energy Used + Energy Wasted** must be demonstrated numerically and clearly both as an overall for the organisation as well as for each of the significant energy consuming processes, systems and equipment

[4] *Individually* does not mean that a factory with 10 similar machines needs to have each of these machines' consumption measured; Individually does not mean that a gaming services company with 50 PCs needs to have their consumption measured individually; ***Individually*** means that a factory with a compressed air, chilled water systems (=2 systems), injection moulding, raw material mixing processes, (=2 processes); heating ovens, factory lighting (=2 major piece of equipment) would need to have the energy use and waste of these six (6) activities measured individually

[5] Just because an organisation is leasing its transportation vehicles (or e.g., aircraft) or is wholly farming out such an activity or business process, does not preclude it from considering the energy consumption profile of this activity, particularly if the organisation can have control or influence over that process, activity or supplier

Regulation Criteria:	***build, whenever possible, on life-cycle cost analysis (LCCA) instead of Simple Payback Periods (SPP) in order to take account of long-term savings, residual values of long-term investments and discount rates;***

- Ensure one defines, distinguishes and applies what needs an LCCA or an SPP type of calculation[6] clearly
- Proposals for improvement must give a calculated value (*not an approximation but a value[7] based on the specific frequency and nature of use within the specific business activity of the organisation, taking into consideration any relevant variables[8]*) of both energy to be saved and cost payback (LCCA or SPP)[9]
- The savings (*energy and cost*) over the whole useful life of the modified or newly installed equipment must be worked out and not only just a yearly saving
- The payback period of every opportunity for improvement for the significant energy consuming systems, processes and equipment must be calculated and shown, independent of whether this is a short term, medium term or long term gain
- If best-available-technology (BAT) as a proposal for improvement exists, it must be researched, identified, mentioned and its potential savings and other benefits calculated and shown[10]
- The input of the organisation's finance department is essential in this exercise and it must be shown, with evidence, that the department was involved and agreed with the financial calculations whether these are of LCCA or SPP.
- All esitmates of costs have to be substantiated by actual quotations from suppliers or other reliable sources and evidence of this included in the report. (*Guestimates or approximations taken arbitrarily by the energy auditor, should not be avoided)*

[6] Criteria of what constitutes a SPP and what constitutes an LCCA are clearly defined in the Energy Auditor Course Notes

[7] Where estimates are used in such a calculation , the source of information that led to that estimate has to be shown, quoted, recorded and explained

[8] Relevant Variables are those variables that will affect the energy consumption but over which the organisation has little or no control (*e.g., ambient weather conditions, demand for products or services*)

[9] They need to give a clear enough , quantified and confident picture of the benefits to allow top management in the organization to decide easily and quickly to invest in the improvement proposal

[10] It is not up to the energy auditor to opt not to consider BAT and decide whether an investment is too high or not for an organisation. The risk and investment appetite of organisations vary and change over time and an organisation may opt to go for BAT at a later date, well after the energy audit has been conducted. The energy audit report must be comprehensive enough for such an eventuality.

Regulation Criteria:	***be proportionate, and sufficiently representative to permit the drawing of a reliable picture of overall energy performance and the reliable identification of the most significant opportunities for improvement.***

- the most significant opportunities for improvement must be shown and prioritized by significance (*amount of energy saved per annum*), taking into consideration the frequency of use of the process, systems or equipment and any relevant variables
- if a prioritisation is needed from a capital expenditure stand-point, this has to be a second prioritisation (*over and above that based on energy savings*)
- A *proportionate* energy audit is one that identifies ***all*** the energy consuming systems, processes and equipment, gives these a value of energy consumed and then drills down and focuses the detail on the significant energy uses, making sure that outsourced energy consuming process, are also included and considered
- A *sufficiently representative* energy audit means that all the activities of the organisation have been investigated and studied, without exception and that the study (*particularly the measurement and collection of data*), covers a representative business window of time/activity and do take into account and consideration, the relevant variables that pertain to that specific organisation's activities and processes
- For a *sufficiently representative* energy audit, data collection and drill-down for the significant energy consuming activities should include measured consumption, usage and wastage data of these specific individual systems, processes and equipment
- The data collected during the energy audit must be suitable in quantity, scope and quality and with a suitable time window of collection, to be able to have a reliable identification of the most significant opportunities for improvement
- The data (*numbers and values*) collected has to be enough (*in quantity and time window*) to prove a verifiable consistent and repeatable energy consumption pattern of systems, processes and equipment
- *Reliable* means that once the energy audit report improvement opportunities are implemented, they do actually give the calculated energy gains[11] and that these gains can be measured and verified
- A reliable identification of the most significant opportunities for improvement can be achieved if the above bullet points are applied to the energy audit[12]

[11] Within a reasonable margin of error

[12] A helpful question to ask oneself by the auditor is: "*if another energy auditor was doing this audit, would he/she have come up with the same the most significant opportunities for improvement".* The answer should be*: "Yes"*

Regulation Criteria:	***Energy audits shall allow detailed and validated calculations for the proposed measures so as to provide clear information on potential savings. The data used in energy audits shall be storable for historical analysis and tracking performance.***

- All calculations that are carried out , *at any stage of the energy audit*, must be detailed and validated and recorded fully, either within the report itself or as an appendix
- Calculations recorded have to show the full detail
- Reams of logged data as an appendix to the energy audit report, do not reflect any calculations carried out
- Estimates are not acceptable unless substantiated by industry accepted evidence
- Approximations are not acceptable
- Guestimates are not acceptable
- Most industries and/or suppliers of equipment, today, provide their own estimates for energy use. These should be referred to and any documented source quoted or included[13] in the energy audit report
- The information on potential savings must be detailed enough and clear enough such that top management can take the report and without the need for further study, go directly to invest and implement the opportunity for improvement immediately, particularly for SPP type of recommendations.
- LCCA recommendations would often need a more in-depth detail than an energy audit allows, but in such cases, the report must provide enough evidence, including measured and collected information and data, such that whoever undertakes the subsequent detailed study, can achieve their outcome, results and conclusions in a swift and reliable manner
- The data used in the audit must be saved securely and reliably for reference if needed.
- The data used is the data that will be used to monitor the energy performance based on the chosen EnPIs[14]
- The data used may need to have its validity confirmed regularly
- The data used must be easily available to refer to, as it is on it that EnPIs are measured and monitored.

[13] All quotations or product specification leaflets/emails/documentation must be included in the energy audit report

[14] Unless considered as totally inadequate or inappropriate, EnPIs should not be changed between one audit and the next as otherwise, comparison of progress cannot be carried out