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# MUNICIPAL ENERGY REFORM PROJECT IN UKRAINE (MERP)

Gap Analysis for energy management  
and energy audit standards

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## BACKGROUND

The primary purpose of the Municipal Energy Reform Project (MERP) is to enhance Ukraine's energy security. Increased end-use energy efficiency combined with increased production of clean energy in large towns and cities will reduce the consumption of conventional energy in Ukraine and, cutting greenhouse gas emissions and energy expenditures and imports. One of the main activities of the Project is to Improve CE Regulatory and Legislative Enabling Environment.

As a signatory of the Energy Community, Ukraine has committed to harmonize its energy legislations, regulations, norms and standards with EU Energy Directives and Energy Standards.

This Report is related to Task 1 of the ToR for ENSI - conduct a gap analysis to compare ISO 50001 requirements with Ukrainian norms/practices on energy management as well as EU requirements to the energy audit standard with current Ukrainian norms/practices.

## UKRAINIAN REGULATIONS

### ENERGY MANAGEMENT

There were no Energy Management norms/regulations reflecting the requirements of ISO 50001 in Ukrainian legislative framework.

In the end of January 2014, the Ukrainian version of ISO 50001 "Energy Management Systems" (named ДСТУ ISO 50001:201x) was prepared and submitted to ENSI for review. The prepared version is a direct translation of the ISO standard into Ukrainian language. ENSI provided a number of comments related to interpretation of some of the terms and requirements of ISO 50001.

### ENERGY AUDITING IN BUILDINGS

The following Ukrainian norm on Energy Auditing was provided by the Project for analysis:

- DSTU 4065-2001 "Energy conservation. Energy Audit. General Technical requirements" (ДСТУ 4065-2001 "Енергозбереження. Енергетичний аудит. Загальні технічні вимоги")

The provisions provided in this standard are mainly related to industrial enterprises, even though the standard states that it includes technical requirement for energy auditing of any type of object.

Briefly the standard has the following content:

#### **1. References to other norms**

Only 2 references are given: on energy balance of the industrial enterprise and on analysis method for electric drives.

#### **2. Definitions**

The definitions are mainly related to application of energy audit in the industrial enterprises. The definition of energy auditing need to be adjusted to the definitions given in EN norms.

In order to address the technical requirements for energy auditing in buildings it is necessary to add such definitions as building, study boundary, energy need, energy carrier, delivered (exported) energies, etc.

#### **3. General Provisions**

This article specifies which information may be excluded from the energy audit, such as energy performance indicators, no-cost energy efficiency measures, economical status of the enterprise, energy auditing conclusions (if agreed with the Client).

There are no general requirements to the qualification of energy auditors.

#### **4. *Requirements to the scope of works within energy auditing***

The article briefly explains the main steps of the energy auditing works (step by step):

- Collection of initial economic and technical information and training of the enterprise's personnel
- Analysis of collected information and preparation of energy balance
- Performing necessary inspection, surveys and measurements; preparation of initial list of possible energy saving measures
- Development and justification of the energy saving measures
- Final selection of the energy saving measures (together with the Client) to be implemented
- Detailed development of selected measures, identification of the suppliers/contractors and procurement organisation
- Participation in implementation of energy saving measures and implementation supervision.

#### **5. *Requirements to the economic status analysis of the enterprise***

The standard briefly describes the main content of the economic status analysis: description of the production costs of the enterprise, calculation of the no-profit point, risk and sensitivity analysis.

#### **6. *Analysis of specific energy consumption***

The article provides brief description of which factors need to be taken into account when identifying specific energy consumption. The article refers to industrial enterprises (analysis of energy consumption in comparison with manufactured products) and do not provide any specifics with regards to the building sector.

#### **7. *Energy Audit Report***

The article specifies what should be the content of the Energy Audit Report:

- Cover page
- Summary
- Annotation (information for the company management)
- General information about the enterprise
- Economic status analysis of the enterprise
- Analysis of specific energy consumption
- Development of energy saving measures
- Detailed conclusions
- Annexes.

The article also names different methods of economic analysis when assessing different energy saving measures (the formula for payback is given with a mistake).

#### **8. *Organisation of energy auditing works***

The article provides some tips on how much time is needed for the energy auditors to complete the work, and what is typical mix of experts in the energy auditing group. For instance, for industrial enterprise 5 days are indicated as normal time for performing energy audit.

The recommendations about time for performing of energy audit and the need for site inspection are very questionable if the energy audit should be of acceptable quality.

The article specifies rules of professional ethics with regards to the confidentiality and objectivity.

**9. Recommendations for selection of the enterprises to be audited**

The article provide recommendations to the energy auditor about which enterprises to select for energy auditing, such as possible energy auditing contract amount for enterprises of different size, the size of the enterprise which is feasible for the energy auditor to provide energy auditing services, qualification of the personnel of the enterprise to be audited, etc.

**10. Implementation and improvement of the energy management system of the enterprise**

The article provides one page general description of the energy management system and defining the main steps of such system (the steps are mainly related to establishing of energy manager position and energy management unit at the enterprise).

**Annex A:** Recommended checklist for obtaining information from the enterprise (checklist covers only energy consumption by different energy carriers and water consumption, and the scope of produced products).

**Annex B:** Example of the energy balance of the enterprise.

**Annex C:** Recommended form of brain storming during preparation of the initial list of possible energy saving measures.

**Annex D:** Example of calculation of no-profit point depending on the scope of production.

**Annex E:** Example of calculation of specific energy consumption (linear model).

**Annex F:** Example of calculation of the main characteristics of energy saving measures.

**Annex G:** Recommended form of energy audit conclusions.

**Annex H:** Typical mistakes during the energy audit.

# EN Regulations and norms

## ENERGY MANAGEMENT

As mentioned in chapter 2.1, in the end of January 2014 the Ukrainian version of ISO 50001 “Energy Management systems” (named as ΔCTV ISO 50001:201x?) was prepared and submitted to ENSI for review.

The ΔCTV ISO 50001 is identical to ISO 50001 “Energy Management systems” and therefore there are no gaps between the standards.

## ENERGY AUDITING IN BUILDINGS

There are two EN norms related to energy auditing in buildings, which are also defined as the main reference point for the gap analysis:

- EN 16247-1 “Energy audits. Part 1: General requirements”
- EN 16247-2 “Energy audits. Part 2: Buildings”

It should be noted that the final version of EN 16247-2 was approved by CEN, only on 28 May 2014 and the final text will be available for the public within 6 months, when the National Bodies will publish it. Since the final version is not available, ENSI used the draft version as basis for this gap analysis. So far it is not known how much the final version was changed in comparison with the draft version (it is only known that there were about 200 comments to the standard from the expert community).

According to Annex A to EN 16247-2, the Energy Audit Process includes the following main steps:

- Primary contact
- Start-up meeting
- Collecting data
- Field work
- Analysis
- Report
- Final meeting

A brief overview of these standards is given in the table below. There chapter numbering in the draft EN 16247-2 does not fully correspond with the numbering in EN 16247-1, but the content (headlines) correspond with those “articles” listed below.

Article	EN 16247-1	EN 16247-2
1. Scope	This standard specifies the requirements, common methodology and deliverables for energy audit can be applied for all forms of establishments, excluding individual private dwellings.	This standard covers specific energy audit requirements in buildings, and specifies the requirements, methodology and deliverable. The standard should be read in conjunction with EN 16247-1.
2. Normative references	No references.	Reference to EN 16247-1.

Article	EN 16247-1	EN 16247-2
3. Terms and definitions	The following definitions are given: energy audit, energy auditor, adjustment factor, audited object, organisation, energy performance indicator	In addition to definitions given in EN 16247-1, the following definitions apply: building, system boundary, energy need, energy carrier, delivered energy, produced energy, exported energy, building services, technical building system
4. Requirements		
4.1 Quality requirements	General requirements to qualifications, confidentiality, objectivity	In addition to requirements given in EN 16247-1, the standard provides general requirements to the competency of the energy auditor
4.2 Audit process	General requirements to preliminary contact, information from auditor, personnel	The standard specifies what matters should be agreed upon during the preliminary contact and refers to Annex B and Annex C
4.3 Start-up meeting	Describes the matters the energy auditor needs to agree with the organisation.	Additional matters to be agreed upon with the organisation during the start-up meeting,
4.4 Data collection	General requirements to historical data, design and operational documentation, etc.	Overview about information request to be given to the organisation, review of available data and preliminary data analysis
4.5 Field Work	Describes the aim of the field work, requirements to the organisation for the site visits	More detailed information about aim of the field work in application to the buildings
4.6 Analysis	Specifies what information should be a result of the analysis	The article provides more information with regards to general requirements for analysis, energy breakdown, performance indicators and energy efficiency improvements opportunities. The article refers to Annex H and Annex I.
4.7 Reporting	General requirements and general content of the report: <ul style="list-style-type: none"> <li>- Executive Summary</li> <li>- Background</li> <li>- Energy Audit</li> <li>- Energy Efficiency Improvements Opportunities</li> <li>- Conclusions</li> <li>- Annexes</li> </ul>	Regarding content of the energy audit report, reference is given to EN 16247-1. Example table of contents is given in Annex J.
		5.7 Final meeting

Article	EN 16247-1	EN 16247-2
		<p>Annex A (informative): Energy audit process flow diagram</p> <p>The process includes the following main steps:</p> <ul style="list-style-type: none"> <li>- Primary contact</li> <li>- Start-up meeting</li> <li>- Collecting data</li> <li>- Field work</li> <li>- Analysis</li> <li>- Report</li> <li>- Final meeting</li> </ul>
		Annex B (informative): Example of parties of an energy audit in buildings
		Annex C (informative): Examples of scope, aim and thoroughness of energy audits in buildings
		Annex D (informative): Examples of checklists for energy audit field work in buildings
		Annex E (informative): Examples of the analysis of energy use in buildings
		Annex F (informative): Examples of analysis checklists for energy audits in buildings
		Annex G (informative): Examples of energy performance indicators in buildings
		Annex H (informative): Examples of energy efficiency improvement opportunities in buildings
		Annex I (informative): Examples of analysis and savings calculations in energy audits in buildings
		<p>Annex J (informative): Examples of the reporting of an energy audit in buildings</p> <p>The list of content of possible report is provided</p>
		Annex K (informative): Examples of energy improvement verification method in buildings

## CONCLUSIONS

1. With regards to Energy Management, a Ukrainian standard identical to ISO 50001 “Energy Management systems” is being developed and will be accepted.
2. With regards to Energy Auditing in buildings:

The existing Ukrainian standard is difficult to apply for the building sector. Therefore we recommend developing a new, separate standard based on EN 16247-1 and EN 16247-2. Regarding qualification and competence of energy auditors, the requirements could be harmonised with prEN 16247-5 Energy Audits. Part 5: Competence of energy auditors. This standard is still in draft version, and it is not known when it will be finalised.

The new Ukrainian standard for Energy Auditing should be based on the final version of EN 16247-2, which could be available for ENSI by the end of August 2014. The standard should be complemented with more specific information/requirements applicable in Ukraine (considering the recent development of Ukrainian National Methodology of energy use in buildings, documentation of energy performance and energy ratings).