

Ethiopia Energy Authority



Energy Efficiency Service Providers and Energy Auditors licensing directive

Directive no 006/2012

November 2019

Addis Ababa, Ethiopia



1. Issuing Authority

This Directive is issued by the Ethiopian Energy Authority pursuant to the authority vested in it by Article 40(2) of the Energy proclamation No.810/2013 and Article 82 of the Energy Regulation of the Council of Ministers No. 447/2019.

2. Short Title

This Directive may be cited as the “Energy Efficiency Service Providers and Energy Auditor Licensing Directive No- 1/2012.”

3. Definitions

The definitions provided under the Proclamation No.810/2013 and Regulation No.44/2019 is applicable to this Directive.

4. Objectives of the directive

- 1/ create environment where energy audit activities are undertaken by competent professional and competent company
- 2/ achieve measurable reduction in energy costs in the service and productive sectors of the economy and reduction of greenhouse gas emissions
- 3/ create new business opportunities to service and product providers in the related field
- 4/ assist and oversee the development of professional and qualified ESCOs and energy auditors
- 5/ provide and enhance energy efficiency service supply market and support the national effort in the promotion of energy efficiency

5. Energy Auditor Licensing

5.1 . Qualifications requirement for Energy Audit License

To apply for licensing as an Energy Auditor, the applicant shall be

- 1/ A Graduate in Engineering (B.Sc. in electrical, mechanical, electro-mechanical, industrial and related) of a Higher Educational Institution and has at least 5 years work experience in the field of energy management, Energy operations, Maintenance or Planning.



- 2/ Master's degree in electrical, mechanical, electro-mechanical, industrial and related Engineering fields and has 3 years' of work experience in the field of energy management, energy operation, and maintenances or planning.
- 3/ In addition to the above sub articles educational qualifications, the applicant shall followed a comprehensive training program complying with Auditor's Training stated in article10.

5.2 . Duties of the Energy Auditors

Energy Auditor shall oblige to:

- 1/ prepare Checklist and Audit program to carry out detailed energy audits
- 2/ quantify energy consumption and establish baseline energy information
- 3/ construct energy and material balance
- 4/ perform efficiency evaluation of energy & utility systems
- 5/ compare energy norms with existing energy consumption levels
- 6/ identify and prioritize energy saving measures
- 7/ analyze the technical and financial feasibilities of energy saving measures
- 8/ recommend energy efficient technologies and alternate energy sources
- 9/ Communicate the findings of the study through comprehensive reports, presentations, etc.
- 10/ provide assistance for implementation of recommended interventions
- 11/ in accordance with Article 21 of Energy Proclamation, a licensed company report shall follow the necessary standards and contain all the required parameters that the energy efficiency and conservation activity intended to accomplish and follow the reporting procedures as provided under Energy Regulation Article 43-44.
- 12/ in accordance with Article 24 and 30 of Energy Proclamation and the Energy Regulation Article 76, a company who performs energy audit service without having license shall be punished accordingly.

5.3 Energy Auditor licensing Assessment procedure

- 1/ The Authority shall announce, a call every three months interval for registration of candidates for energy auditor license



2/ All applications shall be accompanied by the following support documents:

- a) copies of certificates of relevant educational and professional qualifications
- b) a copy of the certificate of the training program, adequacy of which as defined below, as approved by EEA
- c) executive summaries of at least 3 energy audits carried out, with the endorsement of those organizations (In the event of inability to get endorsement, sufficient proofs for the involvement in energy audits should be submitted.)
- d) service letters from the employers in connection with the experience required; and
- e) a copy of the receipt obtained from EEA for the payment of the application fee.

3/ Once the application is submitted with all the required documents, the applicant shall require to secure a passing points/grade; 60% and above.

4/ The successful candidates will be issued a Certificate of licensing as an Energy Auditor.

5/ Detailed information regarding licensed companies and energy auditors will be recorded and appropriate information will be posted on the website of EEA.

5.4. Performance Assessment of Energy Auditors

1/ Licensed Energy Auditors shall require maintaining and enhancing the expertise through active involvement in energy auditing, energy management capacity development activities and training on continued base.

2/ At the end of each 3-year period after licensing, Energy Auditors shall require to submit performance review reports to EEA.

3/ An applicant who fails to demonstrate his/her capacity as energy auditor as assessed by the review report may be given an opportunity to face an interview conducted by a panel appointed by the Authority. Failure in reviews shall lead to cancellation of license.

4/ In the performance assessment, the review focuses on demonstrated capability of the energy Auditor among others in:

- a) conducting sufficient measurements of energy parameters,
- b) detailed analysis of energy flows into and out of main equipment and sub systems of the facility, in order to identify and quantify areas of energy wastage.
- c) improvements to facility design & installation, operation and management.
- d) reduction of energy costs and also for reduction of greenhouse gas emissions contributing to sustainable development.



[Handwritten signatures in blue ink]

- e) assessment of financial and economic viability of the audit findings; and
- f) ethical conduct of the business as in the code of conduct as per Article 12 of this Directive.

5.5. Energy Auditor Training Programs

1/ Energy auditor training programs recognized by EEA in energy auditor licensing over the subject areas given below shall be completed with at least 60 hrs of training, including a practical session of a detailed energy audit of 20 hrs.

2/ Institutes conducting training programs for energy auditors shall register the respective training programs with EEA in order that the completion of such training will be considered as recognized training in the energy auditor licensing process.

3/ In case that the training program has not been recognized by EEA, the recognition of the training institution and the relevancy of the program shall be assessed by EEA.

6. Licensing of Energy Service Companies ESCOs

6.1. Type and Coverage of License

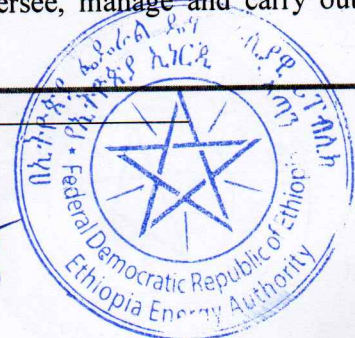
The applicant shall seek to obtain license for energy audit and/or implementation of energy efficiency projects under the following categories:

- a) Building: for whole building audit.
- b) Industry: For specific industry sub-sector or industrial facility.
- c) System/Process: For specific system, component or process audit. Examples include Centralized Chilled water (space/process cooling) /Lighting/ Ventilation /Compressed Air/Boiler/Pumping/ Power Generation / etc.

6.2. Requirements of License

1/ **Full license** – Existing ESCO (in operation for more than 3 years), to qualify for this license, the ESCO shall comply with the following requirements:

- a) Applicants need to have proven expertise, capability and track records in the respective sector(s) of industries and category as indicated in the application, as well as the qualifications and experience of the nominated Licensed Energy Auditor (LEA).
- b) The Applicant shall have under its full-time employment a minimum of 1 licensed Energy Auditors (LEA) as the main person to oversee, manage and carry out energy services work; and



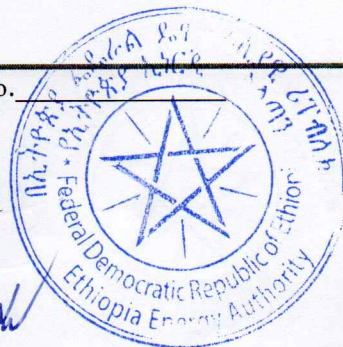
- c) The Applicant shall acquire in any legally possible way calibrated measuring equipment and instrumentation to carry out energy audit, as described below.
- d) For the period of the license, if there is no full-time Licensed Energy Auditor in the company, the Company's information shall be removed from the registration of licensed ESCOs until further notification by the company.
- e) The licensed company shall have full responsibility to promptly notify the EEA of any change within the company with respect to the details and/or presence of Licensed Energy Auditor. -.

2/ **Provisional license** – Newly Formed ESCO (in operation for less than 3 years), to qualify for this license, the ESCO shall comply with the following requirements:

- a) The Applicant shall have under its full-time employment a minimum of one licensed Energy Auditors as the main person to oversee, manage and carry out energy services work; and
- b) The Applicant shall be equipped with calibrated measuring equipment and instrumentation to carry out energy audit, as described below.
- c) The Applicant may be provisionally licensed for two to three years. For subsequent renewal of provisional license, the Applicant shall complete 3 energy audits.
- d) Full licensing may be granted after the Applicant has successfully met the full requirements upon the completion of three years of operation /provisional licensing.

6.3. Conditions of License

- 1/ Applicants Shall submit applications following announcement to be released by the Authority every three months interval.
- 2/ An Applicant, in submitting an application, is deemed to acknowledge that the sole basis of such an application is the submitted document.
- 3/ Applicants are advised to thoroughly read and check the guidelines before submitting an application.
- 4/ Applicant is required to confirm that his submitted Application is accurate and legally authentic.
- 5/ The licensing Committee shall not evaluate any partial and incomplete submission, including failure to submit the necessary required documents.



Handwritten signatures in blue ink are present below the stamp and page number. There are four distinct signatures, including one that appears to be 'Shirvan' and another that looks like 'Zimye'.

6/ In any case where renewal is not completed prior the expiry of the licensed period, the company's information shall be removed from the registered list until further action by the company has been taken to secure validity of the License.

7/ EEA accept no responsibility for any expenses, loss or damage which may arise from the evaluation process; interpretations and preparation made by the Applicant including the information contained therein, or omission from the submitted documents.

6.4. License Criteria Assessment procedures

Upon the receipt of an Application, an assessment shall be made to determine the level of compliance with respect to the established guidelines. Application shall be assessed on the basis of the information submitted.

6.5. General License Assessment Criteria

The general assessment criteria shall include:

- 1/ Performance records on the following aspects of energy efficiency audit/assessment, management and energy efficiency projects:
 - a) Building /facility energy audits or assessments,
 - b) Energy measurement and verification protocols,
 - c) Installation and project management,
 - d) Post-Implementation report of completed projects,
 - e) Records of energy saving achieved (against guaranteed saving, in financial and material terms, where relevant).
- 2/ Industrial and Workplace Occupational Safety Policies and records.
- 3/ Detailed company work profile.
- 4/ An acceptable organizational structure and legal entity.
- 5/ Range of additional service capabilities, e.g. facility management.
- 6/ Reference letters from 3 or more clients whose projects/contracts have been cited in the company/Licensed Energy Audit track records.

6.6. Technical Capability Assessment

1/ Personnel Technical Competency

For the purpose of this licensing, the criterion of technical competency of the Applicants shall be measured in terms of personnel competency. The technically qualified person shall be called the "Licensed Energy Auditor" who must meet the criteria set by EEA.



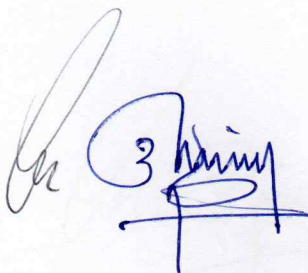
2/ System and Equipment Set-Up

In order to assess the Applicant's adequacy in providing a comprehensive energy audit, the Applicant must provide a list of equipments/instrumentation available for such work, including the photographs and specifications of these equipment's.

3/ The applicant shall also provide details on the status of equipment accuracy and calibration.

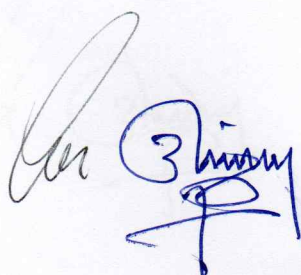
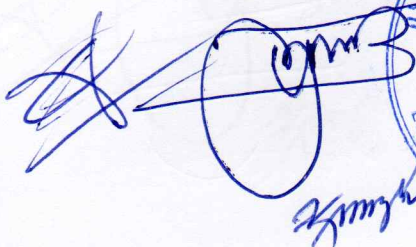
a/ For this requirement, the applicant shall be equipped with, the following instruments to carry out detailed energy audit and collect the required field data:

Essential Energy Audit Equipment		
Tool	Application	Comments/Pictures*
LED Flashlight	Essential for dark spaces, Crawling through dark attics	
25-Foot Tape Measure or Laser Measuring device	To measure some length or areas.	 or 
Hand Tally Counter	To count lighting fixtures specially in large open areas with a non-uniform lighting layout.	
Light Level Meter	To determine lighting levels in different areas of a building.	
Ballast Checker	Check fluorescent light fixtures to see if they have out-dated magnetic ballasts or electronic ballasts.	
Data Loggers	You can put them next to motors, compressors, lights, and many other systems to determine when the machines are turning on/off and other operational data over long periods.	

 3/11/11

Infrared temperature sensor	To measure the temperature of hot surfaces such as windows, hot water pipes, etc.	
Temperature and Humidity Level Indicator/Probe/Sensor	To measure room air temperature and humidity levels.	
Current/Voltage Clamp Meter	To measure current in a circuit without disconnecting/de-energizing it. And also to measure voltage.	
Power Plug Load Meter	To measure plug load energy usage.	
Digital Camera	To take pictures of the building from the outside, equipment tags/labels, and to document what you find during an energy survey. Photos and videos can capture an operation, show an opportunity.	
Calculator	To perform a quick calculation on-site.	
Compass	To determine the building orientation and solar heat gain direction.	


b/ In addition to these instruments listed in the previous page applicant is advised to arrange a means to access and make use of at least the following equipment.

Tool	Application	Comment/Pictures *
Combustion Analyzer or Flue Gas Analyzer	Combustion analyzers calculate the conversion efficiency of; boilers, heaters and furnaces by measuring a range of parameters such as stack temperature (the difference between the flue gas inside the chimney and the room temperature outside the burner), flue pressure and levels of gases.	
Power and Energy Logger	Automatically capture and log voltage, current, power, power factor, energy and associated values for an extended period (measurement and verification).	
Ultrasonic Flowmeter	To determine the velocity of a fluid flowing in a pipe.	
Pressure Indicator/Prober/Sensor	To measure differential pressures of non explosive gases and liquids	
* Please note that the pictures are for illustration purposes, not necessarily an endorsement of the product.		



4/ As for the calibration of equipment, Applicant shall provide information on standard/reference adopted either through Manufacture/Supplier's guidelines/manual or Third Party independent licensing.

5/ Applicant should also provide information with respect to the use of energy simulation software or programs.

7. Submission of Application

1/ when submitting application for Licensing, the Applicant shall complete and submit the following:

- a) A completed Application form
- b) Licensed Energy Auditor Information form
- c) A completed form listing successfully completed Energy Auditing projects. This should include detailed reports, outcomes or results of projects, and clients' endorsement/reference letters bearing the appropriate letter head and name and designation of signatory.
- d) A completed form listing Equipment and instruments used.

2/ The completed forms and documents shall be submitted to EEA for evaluation.

8. Acceptance of Application

Application will be evaluated against the stipulated criteria specified in accordance with Articles 10.3, 11 and 12 of this Directive.

9. Issuance of License

1/ License shall be issued upon successful application.

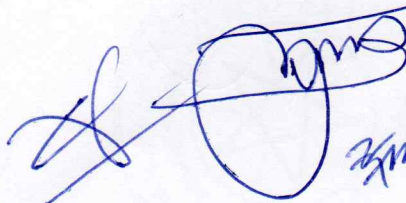
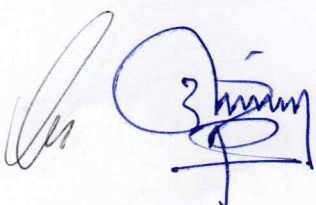
2/ The licensed ESCO shall also be registered on a list of licensed companies.

10. The validity period, Renewal, Replacement, suspension or Revocation of License

The validity period, Renewal, replacement, suspension or Revocation of License provided under the Regulation is applicable to this Directive.

11. Confidentiality

1/ All materials and information submitted with the application shall be held in strict confidence and shall be used for assessment purposes only.



2/ By applying for ESCO licensing, Applicant shall allow and authorizes the sharing of submitted information and documents amongst and within the ESCO licensing Committee.

12. Code of Practice/Conduct

1/ The successful Applicants shall conduct their business in a professional and ethical manner according to the relevant government laws and regulation.

2/ A licensed company shall have the license withdrawn or suspended for the following reasons:

- a) Received complaint(s) lodged by Client(s) for consistently delivering poor quality work where this is confirmed;
- b) Negligence, malpractice fundamentally misleading information and/or fraudulent practice is confirmed;
- c) Major change the company structure and/or personnel takes place;
- d) Information submitted proofed to be misrepresented; and
- e) Where there is no Licensed Energy Auditor in the Company.

3/The Authority has the right to remove a licensed company from the Register; or temporarily suspend any member from the register for a period deemed appropriate.

13. Effective Date

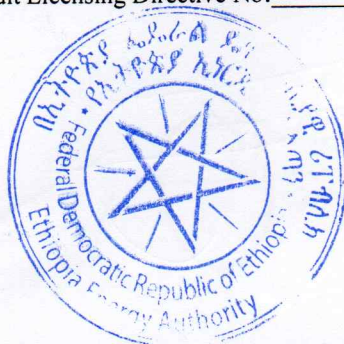
1. This Directive shall enter into force from the date of Approval by the Board
2. The Board when deemed necessary can amend this Directive in consultation with stake holders



Dr. FREHIWOT WELDEHANNA

BOARD CHAIRMAN, ETHIOPIAN ENERGY AUTHORITY

ADDIS ABABA 20 / 02 / 2019 G.C
10



Appendix one

Syllabi for Energy Auditor Training

1/ Energy and Environment (2 hrs)

- a) Emissions associated with energy use especially combustion of fossil fuels Adverse effects on environment
- b) Indoor air pollution Urban air pollution
- c) Global environmental issues – Climate change Options for mitigation
- d) International level initiatives
- e) Notational level initiatives: Emission standards

2/ Energy Management (2 hr)

- a) Importance of energy management
- b) Energy management program: Set-up and implementation Energy accounting, monitoring, evaluation and reporting

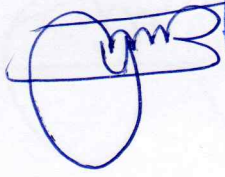
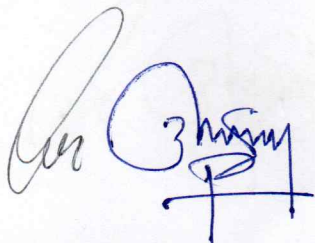
3/ Energy Accounting and Economics (3 hrs)

Principles of financial evaluation

- a) Basic financial components
- b) Analysis techniques
- c) Simple payback period and life cycle cost method
- d) Time value of money, interest formulas and tables
- e) Present worth project life
- f) Net present value and annual cost method
- g) Present worth method and economic performance measures
- h) After tax cash flow analysis and depreciation methods
- i) Internal rate of return and impact of fuel escalation rates
- j) Energy accounting/reporting
- k) Point of use costs and efficiency measures

4/ Electrical Distribution Systems (3 hrs) including practical

- a) Definitions and measurements of electrical parameters Demand and energy load factors
- b) Real power and reactive power Three phase systems



- c) Power factor correction and peak demand reduction Rate structure and analysis of motors & motor drives Power quality and harmonics
- d) Energy auditing of electrical systems stand by generation

5/ Lighting (3 hrs) including practical

- a) Light source, choice of lighting, luminance requirements, and energy conservation avenues light sources, efficiency and Efficacy
- b) Lamp life strike and restrike Lumens and foot-candles
- c) Zonal cavity design method and inverse square law Coefficient of utilization and room cavity ratios Lamp lumen depreciation and light loss factors Dimming and lighting controls
- d) Color temperature and color rendering index Visual comfort factor and reflectors
- e) Ballasts and ballast factor
- f) Lighting retrofits and IES lighting standards

6/ Building Envelope, HVAC System and Control (6 hrs) including practical

- a) Thermal resistance and heat transfer coefficients insulation and vapor barriers
- b) Solar heat gain and solar shading
- c) Thermally light facilities and thermally heavy facilities Conduction heat loads and psychrometric chart
- d) Air heat transfer and water heat transfer
- e) Heating, ventilating, and air conditioning (HVAC) affinity laws and performance rating (COP,EER, KW/ton) HVAC Economizers
- f) HVAC equipment types and air distribution systems (Reheat, multizone, VAV) Degree days and heat transfer energy consumption estimates
- g) Vapor compression cycle and absorption cycle Cooling towers and air & water based heat flow Basic controls and PID controls
- h) Distributed control and central control Optimization controls and rest controls
- i) Building control strategies and communication protocols Expert systems and artificial intelligence
- j) Self-tuning control loops and energy information systems.

7/ Steam Generation and Distribution (4 hrs) including practical

Steam Generation:

- a) Fuels and their properties
- b) Principle of Combustion
- c) Combustion Control
- d) Boilers and their operations & maintenance



- e) Steam Distribution Systems
- f) Parameters effecting system operation
- g) Steam circuits
- h) Insulation
- i) Steam leaks and steam traps
- j) Condensate systems

Energy Conservation in Steam Systems

8/ Electric Motors, Pumps, Blowers, and Compressors (5hrs) including practical

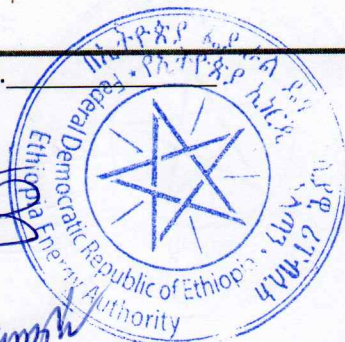
- a) AC induction motors and AC synchronous motors DC motors and high efficiency motors
- b) load factor, slip, power factor and efficiency Motor speed control and variable frequency drives Motor selection criteria
- c) Motor management software Classifications of fluid machinery
- d) Performance characteristics of pumps, fans and blower Fan & pump laws and variable flow systems
- e) Fluid flow system performance
- f) Energy conservation options in pumps. fans and blowers Air compressors
- g) Compressed air distribution system components Air compressor controls and air leaks
- h) Energy conservation options in compressed air systems

9/ Dryers, Furnaces and Kilns (2 hrs) including practical

- a) Kilns and Furnaces: Classification, general fuel economy measures in furnaces, excess air, heat distribution, temperature control, draft control, waste heat recovery
- b) Industrial Dryers: Classifications, mechanisms of drying, performance characteristics, energy saving measures;
- c) Insulation and Refractories: Insulation-types and applications, economic thickness of insulation, heat saving and application criteria, refractory-types, selection and application of refractories, heat loss.

10/ Waste Heat Recovery and Cogeneration (4 hrs)

- a) Waste heat recovery boilers and thermal systems industrial energy management
- b) Fuel choices
- c) Steam systems and steam tables
- d) Heat exchangers, turbines and pumps Topping cycles and bottoming cycles Fuel selection
- e) Prime movers and operating strategies



Thermal Storage

- f) Design strategies and operating strategies
- g) Storage media advantages and limitations
- h) Chilled water storage and ice storage
- i) Sizing volume requirements
- j) Full storage systems and partial storage systems

11/ Measuring Equipment and Techniques (3 hrs) including practical

- a) Role of audits and audit equipment Energy management measures
- b) Combustion analyses and combustion analyzers power and electricity measurement, Temperature and humidity measurement pressure and air velocity measurement
- c) Light level measurement

12/ Energy Codes and Standards (3 hrs)

- a) Buildings Codes
- b) Sustainable design and LEED certification
- c) ASHRAE 90.1 Energy cost budget method LEED EB Certified, Silver, Gold, and Platinum LEED NC LEED CI LEED CS
- d) ENERGY STAR Rating ISO 50001

13/ To get the Certificate of the Training Program, and Examination has to be passed where knowledge of the contents of the Training course will be tested.

