
DRAFT REGULATIONS
CERTIFICATION PROCEDURES FOR ENERGY AUDITORS AND ENERGY MANAGERS

1. Short title and commencement –

- (1) These regulations may be called the National Energy Efficiency and Conservation Authority (Certification Procedures for Energy Auditors and Energy managers) Regulations 20XX
- (2) They shall come into force on the date of their publication in the Official Gazette.

2. Definitions: - (1) In these regulations, unless the context otherwise requires: -

- (a) “Act” means the National Energy Efficiency and Conservation Act, 2016 (XXX of 2016)
- (b) “Advisory Committee” means a committee constituted by the National Energy Efficiency and Conservation Authority under sub-regulation (1) of regulation 13;
- (c) “Agency” means an institution appointed by National Energy Efficiency and Conservation Authority for the purpose of holding National Examination for certification of energy auditors and energy managers
- (d) “Certified energy auditor” or “Certified energy manager” means a person who has been issued a certificate as such under regulation 8
- (e) “Form” means a form appended to these regulations;
- (f) “National Examination” means a National Examination defined in clause (g) of sub-rule (1) of rule 2 of the Energy Efficiency and Conservation (Minimum Qualification for Energy Auditors and Managers) Rules, 2018 and conducted accordingly under regulation 3;
- (g) “Register” means a Register of Certified Energy Auditors, and Certificated Energy Managers maintained by the Authority under sub-regulation (1) of regulation 9

(2) Words and expressions used herein and not defined but defined in the Act or the rules made there under shall have the meanings respectively assigned to them in the said Act or rules.

3. Conduct of National Examination – (1) For the purpose of certification of energy auditor or energy managers, the Authority shall, either by itself or through an agency, conduct the National Examination referred to in clause (f) of sub-regulation (1) of regulation 2.

(2) The Authority shall, by publication in the newspaper, notify the date, time and place where such National Examination shall be conducted.

(3) The National Examination shall be conducted in English Medium.

(4) The Authority may change the examination dates due to some unforeseen circumstances beyond its control.

4. Eligibility for appearing in National Examination – No person shall be eligible to appear for National Examination unless he/she is a Pakistani national, possesses qualifications specified in sub-rule (2) of rule 3 of the Energy Conservation (Minimum Qualification for Energy auditors and Energy Managers) Rules 20XX.

5. Application for admission to National Examination –

(1) A person who is eligible to appear for the National Examination under regulation 4 shall seek admission for such examination by making an application to the Authority in **Form- I /** by applying online through NEECA website.

(2) Each application shall be accompanied by the following amount of fee payable by online payment gateway/demand draft drawn in favour of the National Energy Efficiency and Conservation Authority, Islamabad, namely: -

(a) Application Fee:

(i) For All Candidates, excluding supplementary candidates and candidates applying for up-gradation from energy manager to energy auditor – Rs. Five Hundred only

(b) Certification fee including Examination fee for candidates appearing for Certified Energy Auditor or Certified Energy Manager Examination

- (i) For All Self Sponsored Candidates - Rs Five Thousand only
(ii) For Company Sponsored Candidates- Rs Ten Thousand Only

(c) For Upgradation of certification from energy manager to energy auditor the certification fee shall be as under (applicable to those candidates who have registered earlier as Energy Managers and have EM registration number):

- (i) For All Self Sponsored Candidates - Rs One Thousand five hundred only
(ii) For Company Sponsored Candidates- Rs Three Thousand Only

(d) For all eligible supplementary candidates irrespective of self-sponsored or company sponsored:

- (i) Per Paper - Rs One Thousand five hundred only

(3) Subjects for National Examination for certification of energy auditor or energy manager shall be as specified in the prospectus. Such subjects shall also be displayed on the website of Authority, namely www.enercon.gov.pk. Preparatory material/books based on subjects specified in the prospectus and aforesaid website shall be provided to new candidates for the examination and latest version of books shall be available on aforesaid Authority's website for candidates appearing in the supplementary examination. Candidates appearing in the supplementary examination may purchase hard copy of these books from Authority or the agency, with an additional cost, if any, as may be specified by the Authority from time to time.

(4) A prospectus containing scheme and modalities for the National Examination including eligibility, syllabus and reference material for such examination, shall be made available by the Authority at least three months before the actual date of examination.

(5) The details of papers, the duration of examination, in such papers and maximum marks for each of them shall be as specified in the Table below:

Paper No	Subject of the paper	Duration of the examination	Max Marks
I	General Aspects of Energy Management & Energy Audit.	3 Hrs	150
II	Energy Efficiency in Thermal Utilities	3 Hrs	150
III	Energy Efficiency in Electrical Utilities	3 Hrs	150
IV	Energy Performance Assessment for Equipment and Utility systems (Open Book Examination)	2 Hrs./2.5 Hrs./3 Hrs	100

The topics covered for each paper is specified in Schedule I annexed to these regulations

(6) The scheme for the national examination shall be as under: -

(a) The candidate appearing in national examination for energy manager shall be required to qualify the three papers specified in the above Table - Paper-I, Paper -II and Paper-III.

(b) The candidate appearing in the national examination for energy auditor shall be required to qualify the four papers specified in the above Table as Paper-I, Paper -II, Paper-III and Paper-IV

(c) Candidate registering for Energy Auditor Examination and clearing paper I, II and III, shall qualify as Certified Energy Manager

(d) A qualified certified energy auditor is also a qualified certified energy manager

6. Admission for the National Examination –

- (1) The Authority, or the agency, as the case may be, shall, after scrutiny of application form and being satisfied that the applicant is eligible to appear for the National Examination, admit him for the National Examination by issuing him registration number EA or EM as the case may be, an admission card stating the place, date and time of the National Examination at least fifteen days before the date of the National Examination. The admit card can also be downloaded from the Authority website.
- (2) Where on scrutiny of the application under sub-regulation (1) of regulation 6, an applicant is found ineligible to appear for National Examination, his application shall be rejected for reasons to be recorded in writing and he shall be intimated accordingly.

7. Passing of National Examination –

- (1) A candidate shall be declared to have passed the National Examination if he secures a minimum of fifty per cent marks in each paper for the National Examination.
- (2) An unsuccessful candidate shall be allowed to take a maximum of three/four attempts per paper within six consecutive examinations held by the Authority or the agency, as the case may be, on payment of supplementary fee of rupees one thousand and five hundred per paper by means or demand draft drawn or through payment gateway on authority website in favour of National Energy Efficiency and Conservation Authority, Islamabad. Registration of the candidate for the National Examination will be treated as first attempt irrespective of the fact whether candidate writes the examination or not.
- (3) An unsuccessful candidate shall undertake examination as per the latest version of books based on syllabus in force, which may be downloaded from Authority's website, namely www.enercon.gov.pk.

8. Certification of energy auditors, and energy managers –

(1) For the purpose of certification of energy auditors and energy manager, the Authority shall issue a certificate in **Form-II**. to the person who has passed the said National Examination

(2) The certified Energy Auditor and certified Energy Manager shall be eligible for appointment or designation as Energy Manager in-charge of activities for efficient use of energy and its conservation by any user or class of users of energy in the energy intensive industries.

(3) The certified Energy Manager or certified Energy Auditor shall perform the functions and duties as specified in Schedule II annexed to these regulations.

9. Register of certified energy auditors and certified energy managers –

(1) The Authority shall maintain a Register of Certified Energy Auditor and Certified Energy Manager in **Form-III and Form-IIIA** respectively and include in the said registers the name of persons to whom certificates have been issued under regulation 8.

(2) On being registered as certified energy auditor and certified energy manager under sub-regulation (1) of regulation 9, the certified energy auditor and certified energy manager shall be issued an identity card in **Form-IV**.

(3) Each certified energy auditor and certified energy manager shall be eligible to be designated or appointed as energy manager by the designated consumer under clause (l) of section 10 of the Act.

10. Validity of certification – The certification made under regulation 8 shall be valid for a period of five years and renewable after every five years on an application made to the Authority in **Form V**.

Provided that no such renewal shall be made unless the certified energy manager has attended a short-term refresher training course conducted by the Authority or the agency, as the case may be, and has produced a certificate of participation issued in that behalf.

11. Cancellation of certification –

- (1) The Authority may cancel the certification of energy auditor or energy manager on a complaint made against him for –
- (a) any commission or omission amounting to professional misconduct;
 - (b) any misrepresentation of facts, data or reports on energy consumption;
 - (c) any act amounting to fraud;
 - (d) failure to attend the refresher course

Provided that no such cancellation shall be done by the Authority without giving an opportunity of being heard to such energy manager or energy auditor as the case may be.

- (2) Where the certification of any of the aforesaid professionals is cancelled on the grounds specified in clause (a) to clause (c) of sub-regulation (1), the certification of the said professional shall be placed under suspension immediately on coming to notice or happening of an event specified in such clauses until inquiry is completed and the allegations levelled against such professional is conclusively proved in the said inquiry, the certification of the said professional shall be cancelled and his name shall be removed from the register containing the list of such professionals with the approval of the competent authority.
- (3) Where the certification has been cancelled and his name has been removed on grounds specified in clause (a) to clause (c), of sub-regulation (1) no restoration of his name in the register shall be made by the Authority.
- (4) In case the cancellation has been done on grounds specified in clause (d) of sub-regulation (1), cancellation of the certificate shall be restored as soon as he informs the Authority that he has attended the refresher course.

12. Issue of duplicate certificate or identity card –

- (1) Where the certificate or identity card issued respectively under regulation 8 and sub regulation (2) of regulation 9 has been lost by the Energy auditor or certified

energy manager; the Authority may, on an application made by him in this behalf, duly supported by a copy of first information report lodged with the concerned police station, issue a duplicate certificate or identity card, as the case may be, on payment of a fee of rupees one hundred/five hundred by demand draft drawn in favour of National Energy Efficiency and Conservation Authority, Islamabad.

- (2) Where any certificate or identity card issued by the Bureau is damaged, the Bureau may on an application made in this behalf and on surrender of damaged certificate or identity card, issue a duplicate certificate or identity card on payment of a fee of rupees one hundred by demand draft drawn in favour of National Energy Efficiency and Conservation Authority, Islamabad.

13. Constitution of Advisory Committees –

- (1) The Authority may, for the purpose of these regulations, national examination for energy auditors and energy managers and for their certification and registration constitute an Examination Advisory Committee, a Technical Advisory Committee and a Certification and Registration Advisory Committee.
- (2) Each Advisory Committee shall consist of a Chairperson and not more than six other persons to be nominated by the Authority.

FORM – I

[Refer regulation 5(1)]

APPLICATION FOR NATIONAL EXAMINATION

Examination you are appearing for - Energy Auditor
 Energy Manger

Candidature Company Sponsored Self-sponsored

Signature of Candidate: _____	Passport size Photograph of the candidate with signature across the photo.
For Office Use Only	
Remarks if any	

3. Name of the Applicant*
(First Name) (Middle Name) (Last Name)
4. Fathers Name*
5. Present Address* Permanent Address*
-
-
-
- City* Code* City* Code*
- Province Province
6. Date of Birth*
(Date) (Month) (Year)
7. Sex*: Male Female Others
8. Employment Status: Employed Self Employed Unemployed
9. Present Company= Address 10. Contact Details
Designation Office Phone
- Company Name& Address..... Fax
- Res. Phone
- Email*
- City* Pin Code*... Mobile*
- State
11. Total Work Experience: Years Months
12. Examination Centre preferred
(a) 1st Preference (b) 2nd Preference (c) 3rd Preference
- Present Position

Climate Technology Centre and Network

UN City, Marmorvej 51, 2100 Copenhagen, Denmark
Email: ctcn@unep.org Web : <http://www.ctc-n.org>

13. Requisite Educational Qualifications

Sr. No.	Name of Degree/Diploma	Subject/Branch	Year of Passing (eg: 1988)	University
1				
2				
3				
4				

14. Requisite Experience for fulfilling the eligibility criteria*:

S. No	Name of Employer/Organisation	Designation	Year		Nature of work
			From	To	
1.					
2.					
3.					

15. DD No.*: Amount (Rs)*: Date*:
 Bank Name*:

16. I agree to forward my name to any Training Agency conducting preparatory Training Courses

Yes No

DECLARATION BY THE CANDIDATE

I hereby declare that all the information given in the application form and enclosure are true to the best of my knowledge. I agree that if any information or any statement is found to be incorrect, my admission to the examination would be cancelled. I also understand that it is my responsibility to cross check information from the websites as mentioned in the prospectus for the allotted examination centre and issue of hall

Climate Technology Centre and Network

UN City, Marmorvej 51, 2100 Copenhagen, Denmark

Email: ctcn@unep.org Web : <http://www.ctc-n.org>

admission card. I shall inform the Authority, or the agency, as the case may be, about any change in my mailing address, telephone number and e-mail ID, if any, at the earliest. I also abide by the examination scheme and conditions as mentioned in the prospectus.

Place:
Date:

Signature:
Name:

- * = Mandatory

Form-II

[See regulation 8]

NATIONAL ENERGY EFFICIENCY AND CONSERVATION AUTHORITY

Examination Registration No.....

Serial Number.....

Certification Registration No.....

CERTIFICATE FOR CERTIFIED ENERGY AUDITOR/ENERGY MANAGER

Photograph

This is to certify that Mr./Mrs./Ms.....Son /Daughter of.....who has passed the National Examination for certification of energy auditor/energy manager held in the month of.....(Year) is qualified as certified energy auditor/energy manager subject to the provisions of the National Energy Efficiency and Conservation Authority (Certification Procedures for Energy Auditors and Energy managers) Regulations 2018.

This certificate shall be valid for five years with effect from the date of award of this certificate and shall be renewable subject to attending the prescribed refresher training course once in five years.

His/Her name has been entered in the Register of certified energy manager at Serial Number..... being maintained by the National Energy Efficiency and Conservation Authority under the aforesaid regulations.

Mr./Mrs./Ms.....is deemed to have qualified for appointment or designation as energy manager under clause (l) of section 10 of the Act.

Given under the seal of the National Energy Efficiency and Conservation Authority,

Climate Technology Centre and Network

UN City, Marmorvej 51, 2100 Copenhagen, Denmark

Email: ctcn@unep.org Web : <http://www.ctc-n.org>

this.....day of20.....

(Signature and Seal)

Secretary

National Energy Efficiency and Conservation Authority

Dates of attending the refresher course	Secretary's signature	Dates of attending the refresher course	Secretary's Signature

Form-III
 [See regulation 9 (1)]
 National Energy Efficiency and Conservation Authority

REGISTER OF ENERGY AUDITOR

As on(DD/MM/20YY)			
A.	Certification Information		
1	Name of certified energy auditor		<div style="border: 1px solid black; width: 100px; height: 100px; margin: auto;"> Photograph </div>
2	Father's name		
3	Examination Registration No.		
4	Certificate Registration No.		
5	Date of entry in the Register		
6	Date of issue of certificate		
7	Date of re-validation of Certificate		
8	Revalidation record		
		1	
		2	
		3	

B.	Communication Links		
1.	Postal address with Pin Code
	
	
	
2	e-mail address
	
3	Telephone numbers. with STD Code (R) (O) Cell phone
	

C.	Work Experience from the date on which eligibility criteria has been fulfilled						
	from		to		Brief details of work experience		
	Month	Year	Month	Year	Employer's name and address	Self employment	Job content/ experience
1							
2							
3							
4							

D Personal Information				
1	Date of birth		DD/MM/YY	
2	Nationality			
3	Educational qualification (record only after schooling)			
	Educational course		Institution/University	Year of Passing
1				
2				
3				
4				
5				

E Remarks	

From-III A

[See regulation 9(1)]

NATIONAL ENERGY EFFICIENCY AND CONSERVATION AUTHORITY
REGISTER OF ENERGY MANAGER

As on(DD/MM/20YY)			
A.	Certification Information		
1	Name of certified energy manager		<div style="border: 1px solid black; width: 100px; height: 100px; margin: auto;"> Photograph </div>
2	Father's name		
3	Examination Registration No.		
4	Certificate Registration No.		
5	Date of entry in the Register		
6	Date of issue of certificate		
7	Date of re-validation of Certificate		
8	Revalidation record		
		1	
		2	
		3	

B.	Communication Links			
1.	Postal address with Pin Code			
2	e-mail address			
3	Telephone numbers with STD Code			
	(R)			
	(O)			
	Cell phone			

C.	Work Experience from the date on which eligibility criteria has been fulfilled						
1.	from		to		Brief details of work experience		
	Month	Year	Month	Year	Employers name	Self employment	Job content/ experience

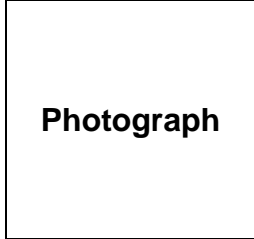
D	Personal Information			
1. Date of birth	DD/MM/YY			
2 Nationality				
3. Educational qualification (record only after schooling)	Institution/University		Year of Passing	
1				
2				

3				
4				

E	Remarks

Form –IV
[Refer regulation 9(2)]
FORMAT FOR IDENTITY CARD
NATIONAL ENERGY EFFICIENCY AND CONSERVATION AUTHORITY

CERTIFIED ENERGY AUDITOR/ CERTIFIED ENERGY MANAGER



Examination Registration No:

.....

...

Certificate Registration No:

.....

.....

Name:

.....

.....

Son/Daughter of:

.....

...

Address:

.....

.....

Signature of Certified Energy Manager

(Backside of Identity Card)

Date of Issue:

.....

Validity up to

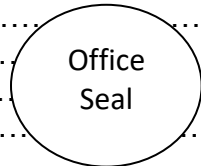
Issuing Authority

Name:

Designation:

Office Address:

Signature:



FORM –V
[Refer regulation 10]
Application for Renewal of Certification

Date:

From

Mr./Mrs./Ms
Registration No
Postal Address:

To

The Secretary
National Energy Efficiency and Conservation Authority

Address:

Dear Sir/madam,

Subject: Renewal of certification as energy manager/ energy auditor

This is to inform you that I have attended the short-term refresher training course and enclose here with the certificate of participation issued in this behalf.

I hereby apply for renewal of my certification as energy manager. The certificate for doing the needful is enclosed.

Yours faithfully,

(Signature).....
(Name).....

Schedule I

SUBJECTS FOR NATIONAL EXAMINATION

Paper I: General Aspects of Energy Management & Energy Audit

1.1 Energy Scenario: Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, Global and Pakistan energy scenario, Sectoral energy consumption (domestic, industrial and other sectors), energy needs of growing economy, energy intensity, long term energy scenario, energy pricing, energy security, energy conservation and its importance, energy strategy for the future.

1.2 National Energy Efficiency and Conservation Act 2016 and related policies: Features of the Act, Designated consumers, Integrated energy policy, Action plan on climate change

1.3 Basics of Energy and its various forms: Electricity basics- Direct Current and Alternative currents, electricity tariff, Thermal Basics-fuels, thermal energy contents of fuel, temperature and pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity and heat transfer, units and conversion and Metric Ton Oil Equivalent (MTOE) conversions.

1.4 Energy Management and Audit: Definition, energy audit, need, types of energy audit, Energy management (audit) approach-understanding energy costs, benchmarking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements. fuel and energy substitution, energy audit instruments and metering, precautions to be taken in the sampling and measurements, thermography, smart metering.

1.5 Material and Energy balance: Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.

1.6 Energy Action Planning: Key elements, force field analysis, Energy policy purpose, perspective, contents, formulation, ratification, Organizing - location of energy

management, top management support, managerial function, roles and responsibilities of energy manager, accountability, Human resource development techniques, Information system-designing: barriers, strategies; Marketing and communicating-training and planning.

1.7 Financial Management: investment-need, appraisal and criteria, financial analysis techniques-simple payback period, return on investment, net present value, internal rate of return, cash flows, risk and sensitivity analysis; financing options. energy performance contracts and role of Energy Service Companies (ESCOs).

1.8 Project Management: Definition and scope of project, technical design, financing, contracting, implementation and performance monitoring, Implementation plan for top management, Planning Budget, Procurement Procedures, Construction, Measurement and Verification.

1.9 Energy Monitoring and Targeting: Defining monitoring & targeting, elements of monitoring and targeting, data and information-analysis, techniques -energy consumption, production, cumulative sum of differences (CUSUM), Energy Management Information Systems (EMIS)

1.10 New and Renewable Energy Sources (NRES): Concept of renewable energy, Solar energy, wind energy, biomass boilers and gasifiers, biogas, bio-fuels, hydro, fuel cells, energy from wastes, bio methanation, wave, tidal, and geothermal

Paper II: Energy Efficiency in Thermal Utilities

2.1 Fuels and Combustion: Introduction to fuels, properties of fuel oil, coal and gas, storage, handling and preparation of fuels, principles of combustion, combustion of oil, coal and gas, Agro-residue/biomass handling, preparation and combustion

2.2 Boilers: Types, combustion in boilers, performance evaluation, analysis of losses, feed water treatment, blow down, energy conservation opportunities. Boiler efficiency calculations for coal, oil and gas, evaporation ratio, Soot blowing and soot deposit reduction, reasons for boiler tube failures, start up, shut down and preservation, Thermic fluid heaters, and super critical boilers.

2.3 Steam System: Properties of steam, steam pipe insulation, assessment of steam distribution losses, steam leakages, steam trapping, condensate pumping and flash steam recovery system, thermo-compressors, Steam utilization, steam dryers, Performance assessment of Steam system and identifying Opportunities for energy savings.

2.4 Furnaces: Classification, Forging furnace, Cupola, nonferrous melting, Induction furnace, hot air generators, excess air, heat distribution, temperature control, draft control, waste heat recovery, heat balance and performance evaluation of a furnace, general fuel economy measures in furnaces.

2.5 Insulation and Refractories: Insulation-types and application, Cold insulation, economic thickness of insulation, heat savings and application criteria, Refractory-types, selection and application of refractories and heat loss assessment.

2.6 Fluidized bed combustion (FBC) boilers: Introduction, mechanism of fluidized bed combustion, advantages, types of FBC boilers- Biomass based fluidized bed combustion boilers, Atmospheric Fluidized bed combustion boilers, Circulating Fluidized bed combustion boilers, Pressurized Fluidized bed combustion boilers, application and operational features, retrofitting FBC system to conventional boilers, saving potential.

2.7 Cogeneration: Definition, need, application, advantages, classification, heat balance, steam turbine efficiency, tri-generation, micro turbines and saving potential.

2.8 Waste Heat Recovery: Classification, advantages and applications, commercially viable waste heat recovery devices, saving potential.

2.9 Heat Exchangers: Types, networking, pinch analysis, multiple effect evaporators, condensers, and distillation column.

Paper III: Energy Efficiency in Electrical Utilities

3.1 Electrical system: Electricity billing, electrical load management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, performance assessment of PF capacitors, automatic power factor

controllers, energy efficient transformers, Star labeled distribution transformers, Assessment of transmission distribution and transformer losses. Demand side management, and losses due to harmonics and voltage unbalance

3.2 Electric motors: Types, squirrel cage and slip ring induction motors and their characteristics, motor history sheet (new. 1st rewind, 2nd rewind), rewinding and motor replacement issues, Star Operation, voltage unbalance, energy efficient motors, losses in induction motors, motor efficiency, energy efficient motors, factors affecting motor performance, soft starters with energy saver option, variable speed drives and energy saving opportunities.

3.3 Compressed Air System: Types Of air compressors. reciprocating vs screw, compressor efficiency, efficient compressor operation, Compressed air system components, Air Driers, capacity assessment, leakage' test, factors affecting the performance and saving opportunities.

3.4 Heating, ventilation, air conditioning (HVAC) and Refrigeration System: Introduction to Psychometrics, Vapor compression refrigeration cycle, refrigerants, coefficient of performance, capacity, ice bank system. performance assessment of window and split room air conditioners, factors affecting Refrigeration and Air conditioning system performance and savings opportunities, ventilation system, cold storage refrigeration, humidification system, Vapor absorption refrigeration system: Working principle, types and comparison with vapor compression system and saving potential, heat pumps and their applications

3.5 Fans and blowers: Types, pressure drop assessment, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities.

3.6 Pumps and Pumping System: Types, performance evaluation, efficient system Operation, flow control strategies and energy conservation opportunities. Energy conservation opportunities in boiler feed water pumps, pumping systems for municipal drinking water, sewerage and agriculture pump sets.

3.7 Cooling Tower: Types, fan-less cooling tower, natural draft cooling tower,

performance evaluation, efficient system operation, cooling water treatment, flow control strategies and energy saving opportunities assessment of cooling towers.

3.8 Lighting System: Light source, Light Emitting Diodes (LEDs), metal halides, fluorescent tube lights, choice of lighting, luminance requirements, energy efficient street lighting, electronic ballast, occupancy sensors, energy efficient lighting controls, energy conservation avenues.

3.9 Diesel/Natural gas Power Generating systems: Factors affecting selection, Waste heat recovery, energy performance assessment of diesel/natural gas power generating systems.

3.10 Energy conservation in Buildings: Building Codes, building envelope, insulation, lighting, heating, ventilation, air conditioning (HVAC), fenestrations, water pumping, inverter and energy storage, captive generation, elevators and escalators, Energy Service Companies based case studies.

Paper IV: Energy Performance Assessment for Equipment and Utility systems

- 1 Boilers, furnaces
- 2 Cogeneration, turbines (gas, steam),
- 3 Heat exchangers.
- 4 Electric motors, variable speed drives,
- 5 Fans and blowers,
- 6 Water pumps,
- 7 Compressors,
- 8 Heating ventilation and air-conditioning (HVAC) systems
- 9 Performing financial analysis.
- 10 Energy Performance assessment in thermal power plants.
- 11 Energy Performance assessment in [mining] sector.
- 12 Energy Performance assessment in textile industry.
- 13 Energy Performance assessment in buildings and commercial establishments.

Schedule II

Functions and responsibilities of Energy Professionals specified in the National Energy Efficiency and Conservation Act, 2016 (XXX of 2016)

01. Certified Energy Manager (CEM)

Certified Energy Manager occupies an important position and is the focal point of all the activities pertaining to energy management in the organization. The certified energy manager provides leadership in the development of policy on Energy Management Action Plan and plays a key role in the formulation of corporate energy policy. Certified Energy managers also perform the activities related with Energy Management, Project Management, Personnel Management and Financial Management at the plant level. He also Further

1.1 Functions and Responsibilities of Certified Energy Manager (CEM) are highlighted below include:

- Establish an energy conservation cell, formulate corporate energy policy, prepare an annual activity plan pertaining to energy management in the organization;
- prepare a report on status of Energy Consumption at the end of every financial year and submit to the Provincial/Federal body constituted for this purpose, with a copy to the Authority, under the[(Clauses 10(l));
- Ensure direction issued to his Designated Consumer videregarding conduct of energy audit conducted by an accredited energy auditor in accordance with the Regulations, 2018 is complied with and details of the action taken on the recommendations of accredited energy auditor is furnished to the concerned Provincial/Federal body, with a copy to the Authority, in accordance with the[10(k)].
-
- Develop and manage training programme for energy efficiency at operating levels;
- Develop integrated system of energy efficiency and environmental improvement;

-
- Initiate activities to improve monitoring and process control to reduce energy costs;
 - Co-ordinate implementation of energy audit/efficiency improvement projects through external agencies;
 - Establish / participate in information exchange with other energy managers of the same sector through association;

02. Functions and Responsibilities of Certified Energy Auditor (CEA)

Certified Energy Auditor involves a systematic study undertaken on major energy consuming sections and equipment including construction of heat and mass balance with a view to identify the flow of energy efficient use of energy in each of the steps and pin-point wastage of energy. A well conducted energy audit would reveal the areas of wastage of energy and it would lead to suggestions for possible energy savings in all sections of a plant

02.1 Functions and Responsibilities of Certified Energy Auditor (CEA) include-

- Carry out a detailed energy audit under the direction of Accredited Energy Auditor as an associate or member of energy audit team;
- Quantify energy consumption and establish base line energy information;
- Construct energy and material balance;
- Perform efficiency evaluation of energy & utility systems;
- Compare energy norms with existing energy consumption levels;
- Identify and prioritization of energy saving measures;
- Analyze technical and financial feasibility of energy saving measures;
- Recommend energy efficient technologies and alternate energy sources;
- Report writing, presentation and follow up for implementation.